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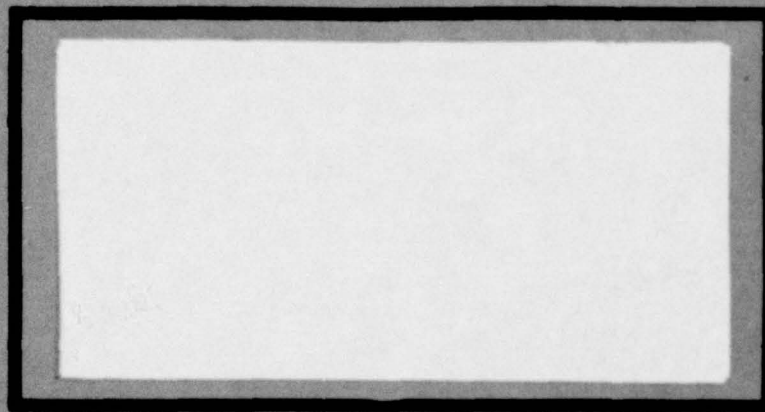
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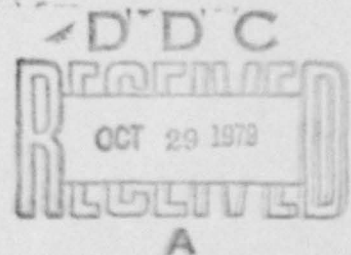
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**A STUDY OF THE RELATIONSHIP
BETWEEN ATTITUDES OF MISSILE COMBAT
CREW MEMBERS AND MISSILE WING
OPERATIONS PERFORMANCE**

Russell J. Anarde, Captain, USAF
Dana H. Bell, Captain, USAF

LSSR 6-79B



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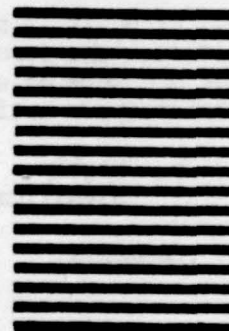


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The focus of past missile career field efforts has centered on the attitudes and motivation of missile crew members. Research has shown that while crew member attitudes toward their job and toward the missile career field have not changed significantly in aggregate terms, attitudes do vary between wings and, perhaps, within wings over time. Little attention has been focused on the possible correlation of these attitudes with unit performance. The purpose of this study was to determine if MCCM attitudes continue to differ from one Minuteman wing to another, to determine if MCCM attitudes within each wing have changed since 1976, to determine if operations performance differs from one Minuteman wing to another, and to determine if any relationship exists between MCCM attitude and Minuteman wing operations performance. The authors conclude that while MCCM attitudes in 1978 differ from one wing to another, MCCM attitudes within each wing have not significantly changed since 1976, that operations performance does not significantly differ from one Minuteman wing to another and, therefore, no basis exists in this study for supporting a relationship between MCCM attitude and Minuteman wing operations performance.

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A STUDY OF THE RELATIONSHIP BETWEEN ATTITUDES OF
MISSILE COMBAT CREW MEMBERS AND MISSILE WING
OPERATIONS PERFORMANCE

A Thesis

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the
Degree of Master of Science in Logistics Management

By

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September 1979

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has been accepted by the undersigned on behalf of the
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fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN LOGISTICS MANAGEMENT

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Michael B. McCormick
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CHAPTER I

INTRODUCTION

Since the onset of the Intercontinental Ballistic Missile (ICBM) era in 1958, considerable attention has been accorded the life of the missileer. The attitudes and motivation of the missile combat crew member (MCCM) have been the subject of a number of research studies. Those who have served on missile crews hasten to point out that the job provides little in the way of motivation or job satisfaction, a phenomenon prophesied by the British writer, Robert Rodwell, upon the introduction of guided missiles to the armed services:

Basically, inactivity will be the cause of the frustration--not inactivity in the sense that there will be little to occupy a serviceman's working day, but the inactivity of the force as a whole. It will be a static, sterile force, prevented by its very nature from ever being fully exercised. There will be no indication to officers or airmen that their combined efforts are achieving anything. They will be denied the satisfaction derived from a job well done [29:66].

Significantly, the combat crew member's job forms the cornerstone of American nuclear deterrence. Deterrence is not merely the sum total of all available weapon systems, but rather the employment of those weapon systems by dedicated professional combat crews (3:2). General Power, former Commander in Chief, Strategic Air Command (SAC),

underscored this point in observing that "SAC's real strength is rooted in our ultimate weapon--the dedication to our mission, the devotion to duty, and the professionalism of SAC's men [27:5]." Crew duty performance requirements are rigid and the crew member faces constant evaluation by both local and higher headquarters inspection teams. He is exhorted to maintain the highest level of system proficiency, to continually rehearse a role he hopes he will never have to fulfill. Thus, the crew member must seek to subdue the job-related boredom and frustration, to develop and sustain an expertise which will form the nucleus of the missile wing's operations effort.

Problem Statement

As the composition of the missile crew force has transitioned to a much younger and less career-oriented force, the interest in job attitudes has intensified. Recent research efforts have concluded that while crew member attitudes toward their job and toward the missile career field have not changed significantly in aggregate terms, attitudes do vary between missile wings and, perhaps, within wings over time (6:110). Little attention, however, has been focused on the possible correlation of these attitudes with unit performance. The problem for research is to determine what relationship, if any, exists between

missile combat crew member attitudes and missile wing operations performance among missile wings over time.

Justification and Delimitation

The focus of past research efforts has been on the attitudes and motivation of missile crew members. Exhaustive analyses have been conducted with the aim of finding a permanent remedy for the ever-ailing morale of the crew force. Research has clearly illustrated that attitudes do vary between wings (6:110); however, what remains to be determined is if these attitudes, both among and within wings, have changed significantly over time.

As previously noted, little effort has been directed at investigating an equally interesting and important area of crew member psychology--relating the level of attitudes to the level of performance. If such a relationship does indeed exist, it would be beneficial to know if the changes in attitude tend to precede, follow, or occur simultaneously with changes in the level of performance. Such information would not only significantly enhance SAC policy decision making but, moreover, serve as a useful point of departure for future research in the area of satisfaction - performance causal analysis.

This research study will use attitude measurements recorded at the six SAC Minuteman wings during 1976 and 1978. Although the 1976 study by Ashbaugh and Godfrey

measured attitudes at all nine SAC missile wings (three Titan II units and six Minuteman units), the 1978 research by Engel and O'Neill focused strictly on Minuteman units so that any attempts to extend conclusions force-wide would be subject to question. Further, the attitude survey conducted at the three Titan II units was administered only to the two officers on the four-man missile combat crew. Since Titan II enlisted crew members are significant contributors to crew and unit performance, these results may not be representative of collective unit attitude.

Literature Review

The review of literature for this study considers three areas of concern: (1) motivation theory, (2) job attitudes and job performance, and (3) selected previous studies of the missile career field. In addition, a brief sketch of missile wing performance evaluation is presented.

Motivation Theory

The bulk of research conducted in the missile career field has employed the theoretical constructs advanced by Maslow, McGregor, and Herzberg (2:67). As such, a brief summary of their views will serve as a foundation for the subsequent discussion of missile career field studies.

Maslow. Undoubtedly, one of the most recognizable names in the area of motivation research is A. H. Maslow.

Maslow's theory of motivation presented a hierarchy of five basic needs (19:80). The first level is composed of the physical needs of physiological drive; for example, hunger, sex, and thirst. If all of an individual's needs are unsatisfied, then the organism is dominated by physiological needs. Once this need is wholly or partly gratified, a higher level need can emerge.

The desire for safety occupies the next level in the need hierarchy. Such things as preference for the known over the unknown and the familiar rather than the unfamiliar evidence this basic drive (19:84).

If both the physical and safety needs are fairly well satisfied, belongingness and love needs (the desire for affectionate relations with people) will become the focus of the organism's attention in the third level (19:89).

The fourth level in the hierarchy is esteem, which is the need for achievement, prestige, and status. Satisfaction of the need produces a sense of self-confidence and worth. Its absence yields feelings of inferiority, weakness and helplessness (19:90).

The final level in Maslow's need hierarchy is the desire for self-actualization or self-fulfillment. It is the fruition of doing what you are best suited for (19:91).

Maslow emphasized that the relationship between need satisfaction and behavior is complex. First, the

hierarchy of basic needs is not fixed. Some needs which are satisfied for long periods of time may become under-evaluated and ignored, as it were, in the shaping of behavior. Second, he suggested that any observed behavior is determined by the interplay of several or all basic needs interacting simultaneously. However, Maslow indicated that behavior is often determined by other than a basic need. For example, those determinants which are programmed into behavior during early childhood are normally most important. Other conditioning influences are exerted by national culture, geographical location, and the historical period in which the person happens to live. Still other determinants of behavior originate in the situation itself (26:101).

McGregor. Douglas McGregor, in broadening the boundaries of motivation theory, defined two distinct management philosophies of worker motivation. The Theory X view assumes that people dislike work and that in order to direct the workers' efforts toward organizational goals, coercion and strong control must be exercised. Further, workers prefer to be treated this way since they seek to avoid responsibility (20:34).

Theory Y, the philosophy generally advocated by McGregor, emphasizes the worker's intrinsic interest in his work, his desire to be self directing, to seek

responsibility, and his capacity to be creative in problem solving (21:377). The Theory Y, or participative approach, more fully utilizes the capabilities of the worker although, as even McGregor admitted, there are work environments where the classical or Theory X approach is equally or more effective (20:245).

Herzberg. Currently, one of the most often employed theories of motivation is Herzberg's motivation-hygiene theory of job attitudes. The central tenet of this theory is that the "factors involved in producing job satisfaction (and motivation) are separate and distinct from those leading to job dissatisfaction [13:56]." Thus, job satisfaction and dissatisfaction are not direct opposites. Two different sets of needs are at work in this process. One set is derived from animal needs; that is, the avoidance of pain and all learned drives which become conditioned to basic biological drives. The other set of needs stems from a desire for psychological growth; that is, the ability to achieve. The stimuli for these needs come from the job environment and job content respectively.

Herzberg identified such factors as achievement, responsibility, and the work itself as exemplary of growth or motivation factors. Dissatisfaction avoidance or hygiene factors include the following: company policy and

administration, supervision, interpersonal relationships, working conditions, salary, status, and security. Herzberg concluded that motivators are the primary cause of satisfaction while hygiene factors are the primary cause of unhappiness on the job (13:86).

Attitudes and Performance

Overview. Attention is now focused on relating the findings of research on the development of attitudes and examining the theories of relationships between performance and job attitudes. The relevant dimension of job attitude most often described in this review will be job satisfaction. Although attitudes are not synonymous with job satisfaction and job satisfaction is not the same as morale, attitudes do contribute to job satisfaction and satisfaction contributes to morale (3:65).

Schwab and Cummings, in their review of literature on the relationship between performance and satisfaction, identified the following three schools of thought:

(1) the view that satisfaction leads to performance, a position generally associated with early human relations concepts, (2) a view that the satisfaction-performance relationship is moderated by a number of variables, a position which gained acceptance in the fifties and continues to be reflected in current research, and (3) the view that performance leads to satisfaction, a recently stated position [30:130].

Their framework will be employed as a guide in this review as well. Some general concepts of attitudes and performance precede the discussion of the interrelationship of

job satisfaction and performance. This section will conclude with results of some current attitude-effectiveness research.

Attitudes. While most writers ostensibly agree that attitudes are learned, there is less consensus on the nature of attitudes as a single concept. Doob defined attitude as an

. . . implicit, drive-producing response considered socially significant in the individual's society. . . . From a psychological point of view, an attitude is an implicit response with drive strength which occurs with the individual as a reaction to stimulus patterns and which affects subsequent overt responses [8:43].

He cautioned against any attempt to predict behavior or classify attitudes on the basis of knowledge of an attitude alone (8:44).

Chein offered another concept of attitudes. He viewed an attitude as "a disposition to evaluate certain objects, actions, and situations in a certain way. . . . Attitudes may be conscious or unconscious, momentary or persistent [7:52]." Chein emphasized the role of the learning process in the development of attitudes. He also cited the individual's often contrary behavior in relation to attitudes as evidence supporting the argument that behavior cannot be predicted from a knowledge of attitudes alone (7:52).

Peak defined attitude in broad terms as referring to "a hypothetical construct which involves organization

around a conceptual or perceptual nucleus and which has affective properties [24:67]." Attitudes, then, involve preferences: liking, disliking, favoring, or not favoring (24:67).

In summary, attitudes appear to be regarded as either

. . . a mental readiness or an implicit predisposition which exert some general and consistent influence on a rather large class of evaluative responses. They encompass the combination of one's perceptions, expectations, values, goals, motivations, and experiences [9:11].

Performance. Performance, or productive performance as intended here, is viewed as a key criterion of organizational effectiveness. The effectiveness of an organization has been described as the

. . . extent to which the organization as a social system, given certain resources and means, fulfills its objectives without incapacitating its means and resources and without placing undue strain upon its members [11:534-535].

Mahoney and Weitzel also identified efficient productive performance as the primary criterion of organizational effectiveness. They concluded that

. . . such performance is closely related to and usually accompanied by a high degree of manpower utilization achieved through job assignments that challenge and utilize the skills available, as well as . . . supportive relationships within the organization which also correlates with efficiency and appear to be a function of the cohesion obtained within the work force and the supervisory support provided the work force [17:360].

The measurement of organizational performance is not an easy task by any means. Organizations have a multitude of goals and, hence, must use many criteria to measure performance. Any performance measurement, however, must include a consideration of effectiveness, the degree to which goals are accomplished, and efficiency, the use of resources in attaining goals (14:174). Further, one need not necessarily follow from the other. An organization may achieve its objectives but with accompanying waste of significant amounts of resources. Conversely, it may efficiently utilize resources but fall short of its end goals.

The specific criterion for measuring the performance or effectiveness of an organization must consider not only its raw productivity, but additionally, the organization's ability to adapt to change and cope with emergencies (11:534). Selection of a criterion must be carefully conducted. Since organizational performance is some function of combined individual performance, it will be useful to examine the latter in greater detail.

Satisfaction + Performance. As noted previously, the impetus for the proposition that satisfaction leads to performance rests with the human relations movement. It appeared in much of the writing during the movement and interfaced well with the human relations value system. The Relay Assembly test room experiments and other similar

experiments tended to support the idea as well (15:20). More recently, the work of Herzberg served to clearly define this view through his dual-factor theory of motivation. Herzberg explained the previously observed low satisfaction to performance relationship by suggesting that usual morale measures employed in job surveys overlap motivation and hygiene factors, thus precluding any positive correlation. The strength of this argument is somewhat tenuous since neither Herzberg nor other proponents of this school of thought have offered an adequate theoretical explanation for the causal relationship they claim to exist between satisfaction and performance (30:131).

Satisfaction ² Performance. The second view, generated in a 1955 review by Brayfield and Crockett of over fifty studies on the subject, casts doubt on the association of performance and satisfaction. They concluded that there was "little evidence in available literature that employee attitudes of the type usually measured in morale surveys bear any appreciable relationship to performance on the job [4:279]." The only noted relationship was one between attitudes and two forms of job withdrawal: absence and turnover. The authors proposed that satisfaction with one's position in a work system does not imply strong motivation to perform well within that system. Further, productivity may only be tangentially related to

the multitude of goals toward which the worker is striving (4:279). However, concomitant high productivity and satisfaction may occur when productivity is viewed as a means of achieving certain goals and the goals are achieved (30:133).

Work conducted at the University of Michigan Institute for Social Research and by March and Simon offered further empirical support for this view. In a 1950 study, University of Michigan researchers found a positive relationship between only one of four attitude measures (pride in work group) with the productivity measures they employed (30:132). March and Simon concluded that performance and satisfaction are both dependent variables. In viewing performance as a dependent variable, they observed that a state of dissatisfaction must be present to direct behavior toward performance to reach a new level of satisfaction. Whether or not performance will consistently be perceived as yielding that satisfaction cannot be validated. Thus, performance requires dissatisfaction but is not necessary for satisfaction (18:51).

Performance + Satisfaction. The work of March and Simon overlap to some extent into the third and final proposition, that performance leads to satisfaction. Although their argument is not taken up here, they did begin to attempt to show satisfaction as being a function

of performance. The research model most often alluded to in supporting this position was developed by Porter and Lawler. Drawing on the earlier work of Vroom, who had found a low but consistent relationship between satisfaction and performance, Porter and Lawler concluded that people are motivated to do things which they feel have a high probability of leading to rewards which they especially value. Job satisfaction is affected by the amount of rewards that people derive from their jobs while the level of performance is conditioned upon the means for attaining rewards (15:23).

This relationship between satisfaction and performance is illustrated in Figure 1-1. Reward is viewed as the link between the two variables. The wavy lines indicate that rewards are imperfectly related to performance. Note that extrinsic rewards, those controlled by the organization and associated with lower level needs such as pay, promotion, and status, bear a weaker relationship, as indicated by the greater wave frequency, to good performance than do higher order need-based, intrinsic or internally mediated rewards (15:23).

The Porter-Lawler model suggests that satisfaction is a function of both the amount of reward received and what is considered to be a fair reward. If satisfaction is dependent on performance, then it becomes an important variable from a practical and theoretical standpoint (15:23).

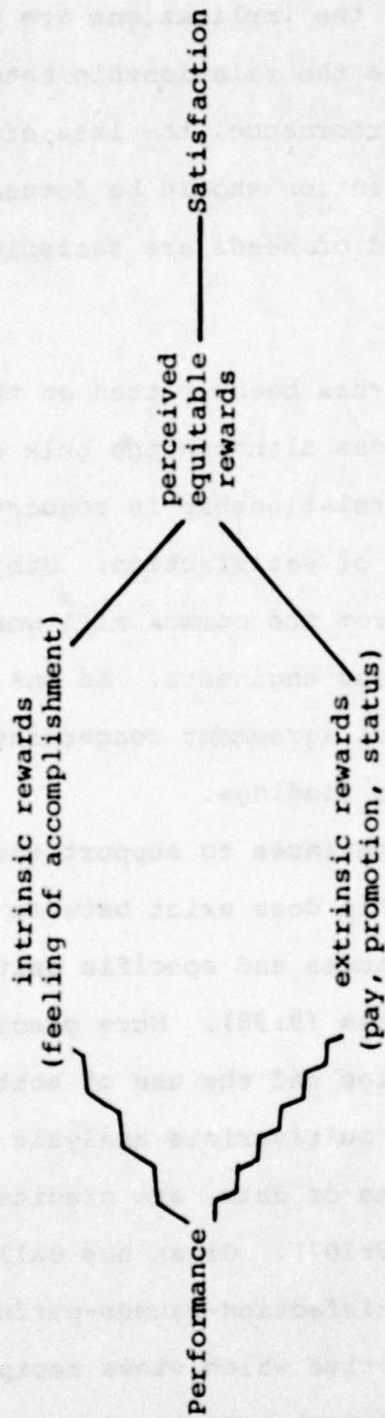


Fig. 1-1. Relationship Between Satisfaction and Performance--
Porter-Lawler Model (15:23)

If the model is accurate, the implications are plainly visible--the less positive the relationship between satisfaction and individual performance, the less effective will be the organization. Attention should be focused on both which people and what kind of needs are satisfied in an organization (15:27-28).

Conclusion. Much has been written on the subject of performance and attitudes although the bulk of the literature on their interrelationship is concentrated along the attitudinal dimension of satisfaction. Subjects of the studies have ranged from the common mill worker to professional accountants and engineers. As one might expect, there is no general agreement concerning the conclusiveness of the various findings.

Recent research continues to support the notion that a positive relationship does exist between specific dimensions of worker attitudes and specific criteria of organizational effectiveness (9:98). More precise measures of these two variables and the use of better statistical techniques, such as multivariate analysis which considers the interrelatedness of data, are credited with these positive findings (9:107). Organ has called for a reconsideration of the satisfaction-causes-performance hypothesis "in the perspective which views reciprocity as a normative determinant of much behavior in organizations [23:51]." He cited research which concluded that people

who are "inequitably over-rewarded prefer reciprocation, if possible," as a means of restoring equity with the benefactor (23:47). In the context of the organization, future performance is viewed as a form of such reciprocation. Moreover, this desired behavior (performance) may stem not only from satisfaction from previously received performance-contingent rewards, but also to those rewards granted on a noncontingent basis; that is, in advance of the behavior which they might cause (23:47-49).

Critics contend that purported associations will continue to vary depending on the performance measure employed (30:139). They claim that for many jobs there is no room for high performance and that productivity depends much more on factors such as technological change or economies of scale (25:108). Hence, satisfaction that a worker can receive in relation to performance is limited (16:121). Perhaps elements of each association coexist, in varying degrees of mix, from one situation to another (23:49). The issue is far from settled.

Previous Missile Career Field Studies

Overview. Much of the research effort to identify and analyze missile crew member attitudes and motivation has been conducted by students at the Air Command and Staff College (ACSC), National War College (NWC), Air War College (AWC), and the School of Systems and Logistics, Air Force

Institute of Technology (AFIT). Some general findings of these studies concerning the missile career field, crew duty, and crew member attitudes merit highlighting.

Summary of General Career Field Findings. Researchers have derived a set of descriptive terms normally associated with the MCCM's job. Those used most frequently refer to the monotonous, routine, boring, and rigid nature of the job (6:35). Most researchers agreed that crew members work in an environment that fosters job dissatisfaction. Among the most frequent dissatisfiers cited were policy and administration, supervision, working conditions, status, and low intrinsic satisfaction from doing their job (1:15; 2:65). Bowe noted that "although MCCMs realize the overwhelming responsibility placed in their hands, they derive little job satisfaction from the responsibility [3:40]." Further, few crew members feel that they receive as much special recognition as other Air Force combat specialties (2:38).

Rodgers W. Bickerstaff conducted a comprehensive review of academic studies of the missile career field from 1965 to 1973. On the basis of this research, he concluded that the key to improving morale in the missile operations career field was to increase job satisfaction. As a means of achieving this, he recommended elimination of a strict demand-response checklist approach in using

technical orders, improvement of the launch control center environment, education of all levels of supervisors regarding special needs of crew members, and a reversal of the reward-punishment scheme which pervades management policy (2:67-71).

Although most studies concluded that efforts should be made to reduce the amount of dissatisfaction, continued analysis of crew member attitude indicates that there has been little overall improvement in the period 1971 to 1978 (1:111-115; 10:102-105).

The remaining literature review is directed toward selected studies related to this research effort.

Brooksher and Scott. The scope of their thesis was quite broad, encompassing career field selection, career development, and the United States Air Force (USAF) officer personnel plan (TOPLINE) (5:12-35). Their analysis was based on the results of three surveys which they conducted. The first two were unstructured pilot surveys sent to senior missile commanders, staff officers, recently retired senior missile commanders, and members of the 3901st Strategic Missile Evaluation Squadron (SMES). The third (structured) survey was directed to 550 current and former MCCMs of which 479 responded (5:8-10). The results of their findings prompted the following general recommendations:

1. Increase career field motivators.
2. Decrease career field dissatisfiers.
3. Improve supervision.
4. Increase MCCM prestige (5:88-142).

For a more thorough examination of specific recommendations and conclusions, the reader is referred to the original document (5:86-142).

Ashbaugh and Godfrey. The purpose of this study was to evaluate whether or not MCCMs' attitudes, job satisfaction, and retention rates had improved since the formation of the SAC Missile Management Working Group (MMWG). The goal of the MMWG was to "develop a better qualified, more experienced, and professional missile force [1:1]."

Ashbaugh and Godfrey developed a 77 question survey to obtain demographic, attitudinal, and other data. In order to provide a basis for comparison, the survey included many questions used in previous studies. Headquarters SAC identified 60 crew commanders and deputy commanders at each of the nine missile wings. Of the 540 questionnaires sent out, they received 372 responses (1:50). Utilizing the chi square (χ^2) and the Mann-Whitney Rank Sum tests to compare their data with the results of previous studies, they concluded that:

1. MCCMs did not have a favorable attitude towards their present jobs or a career in missile operations.

2. MCCM attitudes had not changed significantly from previous studies.

Cancellieri and Willoughby. The major objectives of this study were to:

1. Determine if MCCM attitudes differed from one wing to another.
2. Determine if the demographic composition of the missile crew force differed from one wing to another.
3. Determine if any relationships existed between MCCM attitudes and the demographic composition of the missile crew force of each wing (6:39).

Using the data gathered in the Ashbaugh and Godfrey thesis, a study was conducted to examine variations among the nine missile wings. In addition, the data base was later modified to include only non-rated, company grade, line MCCMs (6:117).

Data were analyzed by using the Kruskal-Wallis one-way analysis of variance (ANOVA) by ranks, the Kendall coefficient of concordance: W, and the χ^2 test for k independent samples (6:48-56). Based on their analysis, they concluded that:

1. There were statistically significant differences from one wing to another in MCCM attitudes toward:
 - a. their job
 - b. the opportunity for individual recognition

- c. the adequacy of individual responsibility
- d. their work schedule
- e. the physical working environment
- f. the opportunity for advancement
- g. the missile operations career field
- h. the adequacy of efforts to improve crew duty
- i. the understanding of crew duty by unit command and staff personnel

2. There was insufficient evidence to support the hypotheses that: (1) demographic composition of the crew force differed from one wing to another or that (2) any relationship existed between that composition and MCCM attitude at each wing (6:109-112).

Engel and O'Neill. The primary purpose for this study was to assess the impact of the Minuteman Education Program (MMEP) on the acquisition and retention of missile launch control officers. Among their objectives were to:

- 1. Sample current attitudes of Minuteman MCCMs toward career field and job.
- 2. Compare the sample of current attitudes with those of the study conducted by Ashbaugh and Godfrey in 1976 (this comparison was made in terms of aggregate attitudinal change, not differences between wings over time) (10:15).

A 61 question survey was developed to gather data in areas to include demographic, job/career field attitudes, attitude toward a missile crew duty career, and other areas of interest to Headquarters SAC. Of the 480 questionnaires distributed, 265 were returned (10:36).

Data were analyzed using the χ^2 test with both one sample and two independent samples, and the Mann-Whitney Rank Sum Test. Based on their results, they concluded that:

1. MCCMs continue to have an unfavorable attitude toward their job and the missile operations career field.
2. The attitudes of MCCMs had improved slightly, but not significantly since the May 1976 study.

Missile Wing Performance Evaluation

Overview. In addition to continual scrutiny by both local and parent Numbered Air Force evaluators, missile wings face two major periodic inspections that measure operations and general wing mission effectiveness: the 3901 Strategic Missile Evaluation Squadron inspection and the SAC Inspector General (IG) Operational Readiness Inspection (ORI). These inspections are highlighted separately with respect to function, frequency, and key areas of missile wing operations evaluation.

3901 SMES. Among its many responsibilities, the 3901 SMES is tasked by Headquarters SAC with evaluating

a missile unit's people, programs, and hardware. As a minimum, the 3901 SMES is required to inspect each SAC missile wing on a scheduled basis every nine months. SMES evaluators check or observe locally administered evaluations of approximately ten combat crews in addition to evaluating the technical aspects of unit standardization/evaluation, Emergency War Order (EWO), and weapon system training programs. Evaluation results provide information concerning not only general personnel proficiency but, in a broader sense, represent a key measure of overall operations effectiveness. Five categories of evaluation ratings are possible: Outstanding, Excellent, Satisfactory, Marginal, and Unsatisfactory.

Inspector General. The mission of the Inspector General is to keep the Commander in Chief, Strategic Air Command (CINCSAC) and other key SAC staff officers "informed as to the state of the command with respect to the efficient and economical performance of the mission thereof [32:1]." As such, he is responsible for inspecting all SAC ICBM activities. The IG team inquires into and reports on all matters affecting a unit's operational, logistical, and administrative effectiveness. Furthermore, he is mandated with the responsibility of evaluating a wing's EWO readiness without prior notice (32:2). Each

SAC missile wing must be inspected at least once every eighteen months.

The focus of attention within unit operations is basically on the same areas as the 3901 SMES inspection, although the IG team is primarily concerned with the more general aspects of training and evaluation programs and the EWO proficiency of the combat crews. Roughly twenty crews per wing are evaluated in the Missile Procedures Trainer (MPT) with additional crews evaluated at the missile complexes. Unit ratings are the same as those assessed by the 3901 SMES.

Objectives

The objectives of this research effort were:

1. To analyze the results of the 1978 MCCM attitude survey to determine if:
 - a. MCCM attitudes continue to differ from one Minuteman wing to another.
 - b. MCCM attitudes within each Minuteman wing have changed since May 1976.
2. To determine if operations performance differs from one Minuteman wing to another.
3. To determine if any relationship exists between MCCM attitude and Minuteman wing operations performance.

Research Propositions and Hypotheses

Research propositions and hypotheses were derived from the first and second research objectives. Support or nonsupport of the propositions and hypotheses was determined through the use of statistical and criteria tests.¹

The specific proposition and hypotheses derived from objective 1a were:

Proposition 1 (Hypotheses 1 through 15)

Attitudes of missile combat crew members toward their job and toward the missile career field continue to differ from one Minuteman wing to another.

Hypothesis 1. MCCMs' attitudes toward their job are not the same at all Minuteman wings.

Hypothesis 2. MCCMs' attitudes toward the manner in which they are supervised by their immediate supervisor are not the same at all Minuteman wings.

Hypothesis 3. MCCMs' attitudes toward the sense of personal accomplishment they achieve in performing their jobs are not the same at all Minuteman wings.

Hypothesis 4. MCCMs' attitudes toward the opportunity for individual recognition provided by their job are not the same at all Minuteman wings.

Hypothesis 5. MCCMs' attitudes toward the actual work involved in accomplishing their jobs are not the same at all Minuteman wings.

Hypothesis 6. MCCMs' attitudes toward the feeling of individual responsibility allowed by their job are not the same at all Minuteman wings.

¹See Figure 1-2 for a schematic of the relationship between research objectives and research propositions, hypotheses, and question.

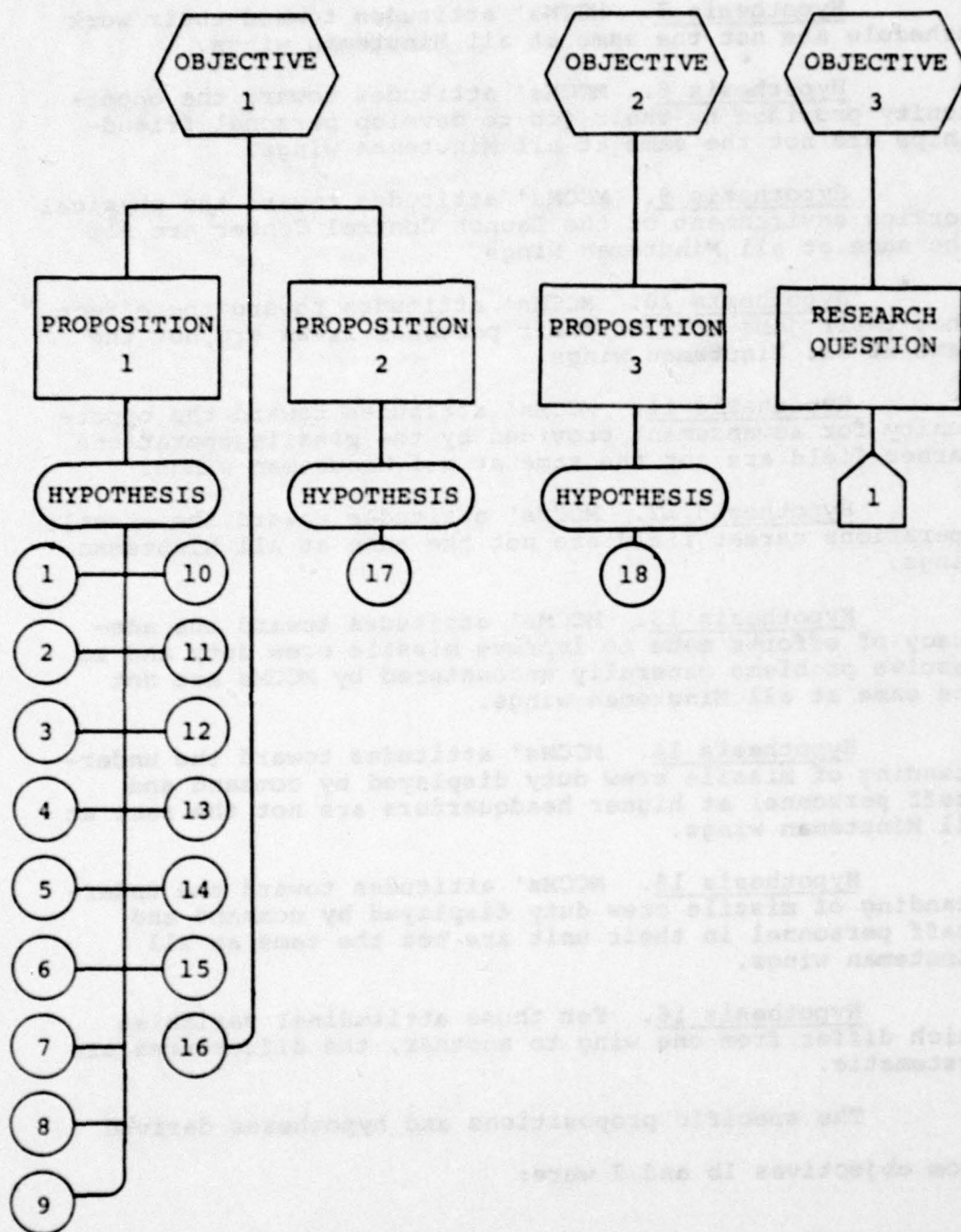


Fig. 1-2. Relationship of Research Objectives, Propositions, Hypotheses, and Research Question

Hypothesis 7. MCCMs' attitudes toward their work schedule are not the same at all Minuteman wings.

Hypothesis 8. MCCMs' attitudes toward the opportunity provided by their job to develop personal friendships are not the same at all Minuteman wings.

Hypothesis 9. MCCMs' attitudes toward the physical working environment of the Launch Control Center are not the same at all Minuteman wings.

Hypothesis 10. MCCMs' attitudes toward the effect that their jobs have on their personal lives are not the same at all Minuteman wings.

Hypothesis 11. MCCMs' attitudes toward the opportunity for advancement provided by the missile operations career field are not the same at all Minuteman wings.

Hypothesis 12. MCCMs' attitudes toward the missile operations career field are not the same at all Minuteman wings.

Hypothesis 13. MCCMs' attitudes toward the adequacy of efforts made to improve missile crew duty and to resolve problems generally encountered by MCCMs are not the same at all Minuteman wings.

Hypothesis 14. MCCMs' attitudes toward the understanding of missile crew duty displayed by command and staff personnel at higher headquarters are not the same at all Minuteman wings.

Hypothesis 15. MCCMs' attitudes toward the understanding of missile crew duty displayed by command and staff personnel in their unit are not the same at all Minuteman wings.

Hypothesis 16. For those attitudinal variables which differ from one wing to another, the differences are systematic.

The specific propositions and hypotheses derived from objectives 1b and 2 were:

Proposition 2

Attitudes of missile combat crew members within each Minuteman wing toward their job and toward the missile career field have changed since May 1976.

Hypothesis 17. Within each wing, MCCMs' attitudes in 1978 are not the same as those in 1976.

Proposition 3

There is a difference in operations performance from one Minuteman wing to another.

Hypothesis 18. Missile operations performance is not the same at all Minuteman wings.

Research Question

In order to achieve the third objective of this research effort, the following research question was posed:

Do changes in MCCM attitudes precede, coincide with, or follow changes in Minuteman wing operations performance?

CHAPTER II

METHODOLOGY

Introduction

As noted by one researcher:

. . . the purpose of any research effort is to support or discover answers to questions through the application of some type of structured procedures. This process will always begin with a question or a problem of some sort and then proceed in an orderly and systematic manner to arrive at a conclusion [9:25].

The objectives and focus of this research have previously been defined. This chapter will outline the procedure to be followed in addressing these objectives. This will include a description of the universe, populations, samples, variables for testing, data, and a discussion of validity considerations, statistical tests, and decision criteria. A summary list of assumptions and limitations will round out the presentation of methodology.

The Universe

The universe of interest consisted of all MCCMs assigned to the six Minuteman wings.

The Populations

Each of the six Minuteman wings, in turn, represented a population from which a selected number of MCCMs were

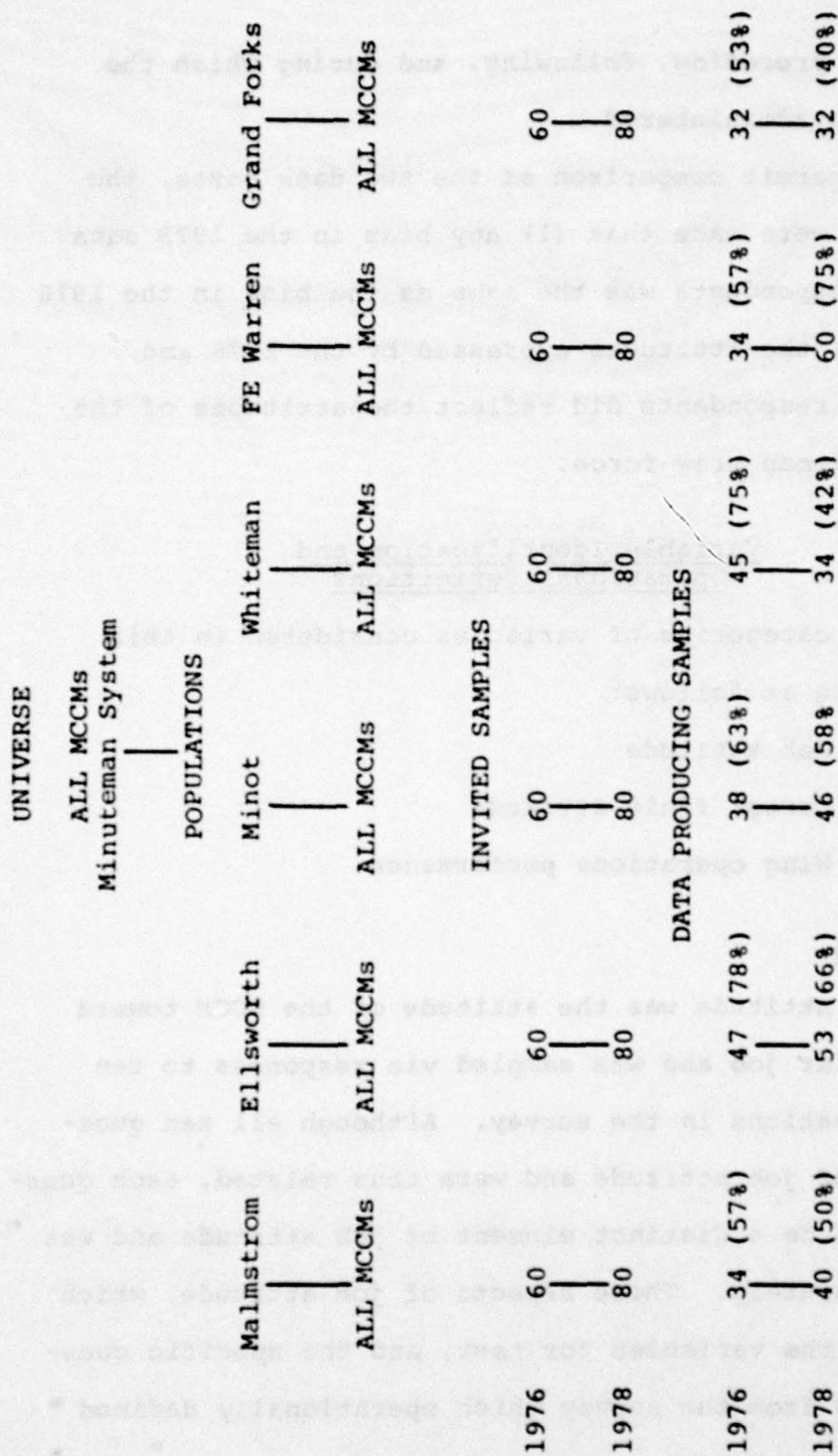
randomly selected to measure certain attitudinal characteristics.

The Samples

The samples were comprised of the groups of MCCMs from each of the six Minuteman wings who responded to the two surveys. The characteristics of interest for comparing the wings were the various attitudinal characteristics reflected by the measurement questions.

The sample for the Engel and O'Neill survey consisted of 80 randomly selected MCCMs from each wing (10:29). This compared with a random sample of 60 MCCMs from each wing in the 1976 Ashbaugh and Godfrey survey (1:39-40). Since two of the Minuteman wings (F.E. Warren and Malmstrom) have four operational squadrons in contrast to three at each of the other four wings, this resulted in a disproportionate stratified random sample (1:39). A synopsis of the described universe, populations, and samples, along with wing response rates for the 1976 and 1978 surveys, is presented in Figure 2-1.

The use of the survey data imposes a limitation on any conclusions reached by this research effort. Measures of MCCM attitudes were limited to the 1976 (Ashbaugh and Godfrey) and 1978 (Engel and O'Neill) surveys. Therefore, any conclusions or inferences are bound by the accuracy of the survey results and the time periods



Year	Totals	Response Rate
1976	230/360	64%
1978	265/480	55%

Fig. 2-1. Survey Universe, Populations, and Samples (1:123-144; 10:114-120)

immediately preceding, following, and during which the surveys were administered.

To permit comparison of the two data bases, the assumptions were made that (1) any bias in the 1978 data due to nonrespondents was the same as the bias in the 1976 data and (2) the attitudes expressed by the 1976 and 1978 survey respondents did reflect the attitudes of the entire Minuteman crew force.

Variable Identification and Operational Definitions

The categories of variables considered in this analysis were as follows:

1. Job attitude
2. Career field attitude
3. Wing operations performance

Job Attitude

Job attitude was the attitude of the MCCM toward his particular job and was sampled via responses to ten attitude questions in the survey. Although all ten questions sampled job attitude and were thus related, each question focused on a distinct element of job attitude and was treated separately. These aspects of job attitude, which represented the variables for test, and the specific question numbers from the survey which operationally defined

the variables are highlighted in Table 2-1. An extract containing these survey questions appears in Appendix A.

Career Field Attitude

Career field attitude was the attitude of the MCCM toward the missile career field and was sampled via responses to five attitude questions in the survey. Again, each question dealt with a distinct aspect of career field attitude and was treated separately. The career field variables for test and their corresponding survey question numbers appear in Table 2-1.

Wing Operations Performance

Wing operations performance was defined by the computed numerical index scores. The calculation of this index will be more fully explained in the subsequent section on data description. Basically, subjective weights were assigned to different areas of evaluation within wing operations and points assessed on the basis of 3901 SMES and IG evaluation ratings for those areas.

Data Description

Each of the fifteen attitude measurement questions in the 1976 and 1978 surveys provided ordinal level data. Twelve questions permitted five possible responses and were classified as discrete limited. Question 21 dealt with missile career field intentions and contained three

TABLE 2-1

VARIABLES AND DATA CLASSIFICATION

Hypothesis #	Question #	As Measured by the Survey Questionnaire	Nature of Variable	Level of Data	Classification of Data for Testing
1	18	The attitude of MCCMs toward their job	Job Attitude	Ordinal	Discrete Limited
2	12	The attitude of MCCMs toward their supervisor	Job Attitude	Ordinal	Discrete Limited
3	15	The MCCMs feeling of a sense of personal accomplishment in their job	Job Attitude	Ordinal	Discrete Limited
4	21	The MCCMs feeling that their job offers a reasonable opportunity for individual recognition	Job Attitude	Ordinal	Discrete Limited
5	14	The attitude of MCCMs toward the actual work involved in accomplishing the job	Job Attitude	Ordinal	Discrete Limited
6	13	The feeling of MCCMs that they are given adequate individual responsibility in their job	Job Attitude	Ordinal	Discrete Limited
7	20	The attitude of MCCMs toward their work schedule	Job Attitude	Ordinal	Discrete Limited
8	16	The feeling of MCCMs that their job provides ample opportunity to develop personal friendships with coworkers	Job Attitude	Ordinal	Discrete Limited

TABLE 2-1--Continued

Hypothesis #	Question #	As Measured by the Survey Questionnaire	Variable for Test	Nature of Variable	Level of Data	Classification of Data for Testing
9	17	The attitude of MCCMs toward the physical working environment of the LOC to be satisfactory		Job Attitude	Ordinal	Discrete Limited
10	19	The feeling of MCCMs that their job has a favorable effect on their personal life		Job Attitude	Ordinal	Discrete Limited
11	27	The feeling of MCCMs that the opportunity for advancement in missile operations is at least as good as other career fields		Career Field Attitude	Ordinal	Discrete Limited
12	26	The feeling of MCCMs that the missile operations career field offers a promising future		Career Field Attitude	Ordinal	Discrete Limited
13	31	The feeling of MCCMs that adequate efforts have been made to improve missile duty and resolve problems		Career Field Attitude	Ordinal	Discrete Limited
14	24	The feeling of MCCMs that missile duty is fully understood and appreciated by command and staff personnel at higher headquarters		Career Field Attitude	Ordinal	Discrete Dichotomous
15	22	The feeling of MCCMs that missile duty is fully understood and appreciated by local command and staff personnel		Career Field Attitude	Ordinal	Discrete Dichotomous

possible responses permitting data classification as discrete limited. Questions 22 and 24 permitted only a yes-no response and thus were classified as discrete dichotomous (10:118).

According to Siegel, in those cases where a dichotomous outcome is observed but there exists an implied underlying continuum in the score or response, the data may be considered as ordinal (31:25). Such an assumption was made here with respect to questions 22 and 24; that is, the responses were considered to have fallen on a continuum similar to the other questions. The assumption was also made that the responses to the questions represented the honest opinions of the MCCM respondents.

Performance data consisted of SAC IG and 3901 SMES Minuteman wing operations area ratings for the period 1974-1978. Although other unit (wing) evaluations were conducted during this time, they were not deemed as critical or meaningful in assessing wing operations performance. The performance measures provided ordinal level data.

In order to provide a method for comparing operations performance among the six Minuteman missile wings, two performance indices were formulated for each wing, based on IG and 3901 SMES results respectively. Although both IG and 3901 SMES inspections encompass nearly all activities of a missile wing, certain key areas more definitively reflect MCCMs' contributions to the wing's

operations performance. The performance indices were weighted to emphasize MCCMs' evaluation (as compared to standardization and training program) results. The weights were based on IG and 3901 SMES inspectors' perceptions of MCCMs' contributions to operations performance (28; 34). The key areas identified and their respective maximum available points are illustrated in Table 2-2.

TABLE 2-2
SAC IG AND 3901 SMES OPERATIONS INSPECTION
AREAS AND AVAILABLE WEIGHTED POINTS

IG	Maximum Available Points	3901 SMES	Maximum Available Points
Crew Performance	30	Crew Proficiency	40
Crew EWO Knowledge	30	Standardization/ Evaluation	30
Standardization/ Evaluation	20	Training	30
Training	<u>20</u>		<u> </u>
	100		100

The data were classified as discrete limited since each area can be rated in four to five categories. Table 2-3 shows IG and 3901 SMES rating scales for the period 1974-1978.

The numerical index for each inspection represented the sum of the points assigned each rating across the areas listed in Table 2-4. For years in which a wing received

TABLE 2-3

SAC IG AND 3901 SMES RATING SCALES--1974-1978

IG--1974 3901 SMES-- 1974-1976	IG--1975	IG--1976-1978 3901 SMES-- 1977-1978
Excellent	Outstanding	Outstanding
Satisfactory	Satisfactory	Excellent
Marginal	Marginal	Satisfactory
Unsatisfactory	Unsatisfactory	Marginal
		Unsatisfactory

two 3901 SMES inspections, the assigned performance index was based on the average of the indices assigned to each inspection. In addition, the 3901 SMES rates individual MCCM proficiency as "Highly Qualified," "Qualified," and "Unqualified." Points assigned to this inspection area were based on the number of MCCMs rated in each category. A complete listing of IG and 3901 SMES inspection results and their corresponding performance indices is contained in Appendix B.

Two assumptions relevant to the construction of the performance indices require mention. First, the assumption was made that SAC IG and 3901 SMES ratings were administered impartially and consistently. Second, it was assumed that the impact of changes in IG and 3901 SMES rating criteria and scales was equally distributed across the six Minuteman wings in the year of the change and did not unilaterally alter wing performance rankings.

TABLE 2-4

SAC IG AND 3901 SMES RATING SCALE POINT ALLOCATION

30 Point Maximum Available				
Excellent	Outstanding	30	Outstanding	30
Satisfactory	Satisfactory	20	Excellent	22.5
Marginal	Marginal	10	Satisfactory	15
Unsatisfactory	Unsatisfactory	0	Marginal	7.5
			Unsatisfactory	0
20 Point Maximum Available				
Excellent	Outstanding	20	Outstanding	20
Satisfactory	Satisfactory	13.4	Excellent	15
Marginal	Marginal	6.7	Satisfactory	10
Unsatisfactory	Unsatisfactory	0	Marginal	5
			Unsatisfactory	0
40 Point Maximum Available				
2 X (Number of "Highly Qualified" MCCMs)				
+ 1 X (Number of "Qualified" MCCMs)				
+ 0 X (Number of "Unqualified" MCCMs)				

Validity

Internal Validity

Subjective support for the validity of attitudinal data received via the questionnaire was offered through the careful and systematic construction of the questionnaire being analyzed. Survey questions were randomized using a random number table to encourage honest responses to questions, minimize comparison of answers, and minimize the effect of similar questions in prompting a respondent to answer a question based on his response to a prior question (1:31).

The questionnaires in both studies were critically reviewed by various agencies, including the AFIT Research and Administrative Management Department, School of Systems and Logistics; the Missile and Subsystems Branch, HQ SAC; and the Palace Missile Branch, AFMPC. These reviews were aimed at eliminating bias and ensuring appropriateness (1:31; 10:113).

Performance data from 3901 SMES and IG evaluations, while based on somewhat dissimilar grading criteria, are used by SAC to measure missile wing operations effectiveness. Weights assigned to the selected operations areas were coordinated with HQ SAC IG and 3901 SMES evaluators and were consonant with the authors' experience in standardization-evaluation at the wing level.

External Validity

Subsequent research efforts may select other measures of operations performance and decision rules in approaching this research problem; however, within the constraints and limitations noted, the results of this analysis are representative of the real world of the Strategic Air Command. All techniques and practical decision rules were impartially and consistently applied to yield statistically supportable conclusions which could be generalized to the defined populations.

Statistical Tests

Five nonparametric statistical tests were used to make statistical inferences about the populations. These tests were the Kruskal-Wallis one-way analysis of variance (ANOVA) by ranks, the Kendall coefficient of concordance: W , the Mann-Whitney U test, the Friedman two-way analysis of variance (ANOVA) by ranks, and the Spearman rank correlation coefficient: r_s . Nonparametric statistics were appropriate because: (1) the characteristics as measured produced ordinal level data (all four of the aforementioned tests require ordinal or higher level data), and (2) the population distributions were unknown and nonparametric statistics require no assumptions concerning the distribution of underlying populations (31:31). Actual computations for the statistical tests were performed by the Control Data

Corporation (CDC) Cyber 70 and the Honeywell 6000 computer systems (22; 33).

Kruskal-Wallis One-Way Analysis
of Variance (ANOVA) by Ranks

The Kruskal-Wallis one-way ANOVA measures whether k independent samples are from the same or different populations. The null hypothesis tested by the procedure was that the k samples (the six missile wings) came from the same population or identical populations with respect to averages (31:184).

Thus, the general statements of hypotheses for testing for each of the fifteen attitude questions were:

H_0 : There is no difference in MCCM attitudes among the six Minuteman wings.

H_1 : There is a difference in MCCM attitudes among the six Minuteman wings.

The first step in applying the Kruskal-Wallis test was to rank order the observations and sum the rankings for each category (31:185). Hence, all of the 265 responses for each attitude question were ranked and the rankings summed for each of the six missile wings.

Once the ranks were established, the H statistic was calculated. For large samples, the H statistic is distributed as a chi square (χ^2) (31:185). Since k (number of samples) equals six for this thesis, the χ^2 ($k-1$) distribution was applicable for evaluating the H statistic.

Since for each of the attitude questions there were at most five possible responses, a significant number of ties occurred. When a tie occurred, each score was given the mean of ranks for which it was tied. The general expression of H corrected for ties is:

$$H = \frac{12}{N(N+1)} \sum_{i=1}^k \frac{R_i^2}{n_i} - 3(N+1)$$

$$1 - \frac{ET}{N^3 - N}$$

where:

k = number of samples,

n_i = number of cases in the ith sample,

$N = \sum n_j$, number of cases in all samples combined,

R_i = sum of ranks in the ith sample,

$\sum_{i=1}^k$ = summation over i samples,

$T = t^3 - t$, and

t = number of tied observations in a tied group of scores (31:188).

Note that the effect of ties is to increase the value of H which makes the result more significant than if left uncorrected. When the probability associated with the value of H was less than or equal to the previously set level of significance, $\alpha = .05$, H_0 was rejected in favor of H_1 .

Kendall Coefficient of
Concordance: W

Those attitude questions which indicated a difference among the wings, as identified by the Kruskal-Wallis test, provided the data to determine the Kendall coefficient of concordance: W. The rankings for each of the wings, based on the mean value of responses (R_i/n_i), reflected the degree of association, W, among the attitude measures of the six Minuteman wings.

The Kendall coefficient of concordance: W was used to test the null hypothesis (H_0) that each set of rankings were independent (31:236). For the significant attitude measures, the general statements of the hypotheses were:

- H_0 : There is no agreement (independence) among the attitude measures in their rankings of the six Minuteman wings.
- H_1 : There is agreement (no independence) among the attitude measures in their rankings of the six Minuteman wings.

To derive W, rankings associated with significant attitude questions were summed and divided by the number of wings to obtain a mean value. The mean value was used to calculate the sum of squares of deviations from the mean, s. Since the possibility of ties in rankings existed, the general form of the equation for calculating W was used. This equation, as shown by Siegel is:

$$W = \frac{s}{\frac{1}{12}k^2(N^3 - N) - k \sum \frac{T}{T}}$$

where:

s = the sum of the squares of the observed deviations from the mean of R_i ,

k = number of sets of rankings (significant attitude questions),

N = number of objects ranked,

$$T = \sum \frac{(t^3 - t)}{12},$$

t = number of tied observations in a group, and

$\sum \frac{T}{T}$ = summation of T for all k ranking (31:234).

The calculated W reflected the amount of agreement among the attitude measures in rank ordering of the wings. For samples with $N \leq 7$, the test for significance consisted of comparing the observed values of s with the critical values of s associated with W significant at the .05 level. The significance test provided the basis for accepting or rejecting the null hypothesis.

The Mann-Whitney U Test

The Mann-Whitney U test is used to determine whether two independent groups have been drawn from the same population. The Mann-Whitney test was employed to determine whether or not the MCCMs' attitudes within each

Minuteman wing have changed since the May 1976 survey. The MCCMs' responses to the 1976 and 1978 attitude surveys from each wing provided the input sample data.

The Mann-Whitney test was used to test the null hypothesis (H_0) that the MCCMs' 1976 and 1978 survey responses have the same distribution. The general statements of the hypotheses were:

H_0 : There is agreement between each wing's 1976 and 1978 attitude survey response distribution.

H_1 : There is no agreement between each wing's 1976 and 1978 attitude survey response distribution.

If "a" was one observation from Wing X in 1976 and "b" was one observation from Wing X in 1978, H_0 assumes the probability that "a" is greater than "b" is equal to .5 and H_1 assumes the probability is not equal to .5.

To compute U, the MCCMs' survey responses from each wing for 1976 and 1978 were ranked together. The Mann-Whitney test assumes that the measured observations represent a distribution which has underlying continuity. Thus, the possibility of a tie is considered to be zero. However, with the measures employed in this research, ties occurred. Ties were accounted for by giving the tied responses the average of the ranks they would have received if no ties had occurred. The equation for calculating U, as shown by Siegel, is:

$$U = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1$$

where:

n_1 = number of cases in the smaller group (1976-230),

n_2 = number of cases in the larger group (1978-265),
and

R_1 = sum of the ranks assigned to the group whose
sample size is n_1 (31:120).

In cases of large sample size ($n_2 > 20$), the sampling distribution employed in the Mann-Whitney test approaches the normal distribution. The general expression of z corrected for ties is:

$$z = \frac{U - \frac{n_1 n_2}{2}}{\sqrt{\left(\frac{n_1 n_2}{N(N-1)}\right) \left(\frac{N^3 - N}{12} - \sum T\right)}}$$

where:

$N = n_1 + n_2$,

$T = \frac{t^3 - t}{12}$, and

t = number of observations tied for a given rank
(31:124).

The value of z was used to determine the probability associated with the observed value of U . The associated probability provided the standard against which the null hypothesis was tested with a significance level of .05.

Friedman Two-Way Analysis of
Variance (ANOVA) by Ranks

The Friedman two-way ANOVA measures whether k related samples have been drawn from the same or different populations with respect to ranks (31:166). The test was used to determine whether the six Minuteman wings performed consistently over time.

The general statements of the hypotheses testing for differences in performance were:

- H_0 : There is no difference in performance among the six Minuteman wings.
- H_1 : There is a difference in performance among the six Minuteman wings.

Rejecting the null hypothesis, then, indicated that at least one of the bases had a (statistically) significantly better performance than another.

In applying the Friedman test, the first step was to arrange the respective IG and 3901 SMES performance indices into identical two-way tables having 5 rows and 6 columns. The rows represented the matched sets of subjects (years) and the columns, the conditions (bases) (31:166). The advantage of using the two-way layout rested in its property of permitting comparison of wing results for each year rather than all performance ratings simultaneously (12:314-315). Thus, differences in evaluation guidelines, turnover of inspection team members, periodic presence of

command interest items, etc. which might constrain conclusions reached via a one-way analysis were effectively filtered out.

The second step of the test called for ranking the six performance scores across each of the years and then summing the ranks for each column. In the event of ties, the average rank was substituted for the tied values (31:171).

Once the rank totals (R_j) were determined, the Friedman test statistic, denoted as χ_r^2 , was computed. According to Siegel, when the number of rows and/or columns is not too small, it can be shown that χ_r^2 is distributed approximately as chi square, $df = k-1$, when

$$\chi_r^2 = \frac{12}{Nk(k+1)} \sum_{j=1}^k (R_j)^2 - 3N(k+1)$$

where:

N = number of rows,

k = number of columns,

R_j = sum of ranks in j th column, and

$\sum_{j=1}^k$ directs one to sum the squares of the sums of ranks over all k conditions (31:168).

Since $k=6$, the $\chi_r^2(k-1)$ distribution was appropriate for testing the null hypothesis. If the probability associated with the value of χ_r^2 was less than or equal to the

previously set level of significance, $\alpha = .05$, then H_0 was rejected in favor of H_1 .

The Spearman Rank Correlation
Coefficient: r_s

Once the rankings for each of the wings were established for significant attitudinal measures using the Kruskal-Wallis method, and for operations performance, using the performance index, the Spearman rank correlation coefficient: r_s was to be used to measure the degree of association between the data ranked in two ordered series. Wing performance rankings for periods before, during, and after the attitude survey completions were to be compared to wing rankings based on significant attitudinal measures obtained from the surveys. Comparison of the observed r_s values would have provided an indication of the relationship between attitudes and performance and, thus, the basis for answering the research question. Due to limitations discussed in the subsequent chapter on data analysis, however, the Spearman test could only be applied to 1978 attitudinal and 1974-1978 performance data and, then, only for purposes of providing general information. The remaining discussion of the test procedure is presented to outline its limited application in this study and to serve as a model for future research.

To compute r_s , a list of the N subjects (wings) was compiled. Next to each subject's entry, the rank for

the X variable (wing attitude) and the rank for the Y variable (performance) were entered. The various values of d_i , the difference between ranks, were computed, squared, and then summed. Since the possibility of ties in rank orderings existed, the form of the equation used for calculating r_s , as shown by Siegel, was:

$$r_s = \frac{\sum x^2 + \sum y^2 - \sum d^2}{2\sqrt{\sum x^2 \sum y^2}}$$

where:

$$\sum x^2 = \frac{N^3 - N}{12} - \sum Tx ,$$

$$\sum y^2 = \frac{N^3 - N}{12} - \sum Ty ,$$

$$\sum d^2 = \sum d_i^2 = \text{the sum of square differences between ranks,}$$

N = number of subjects ranked,

ET = the sum of values of T for all groups of tied observations,

T = ranking correlation factor given by $\frac{t^3 - t}{12}$, and

t = the number of observations tied at a given rank (31:207).

The calculated r_s reflected the amount of correlation between performance and attitude rankings for all wings. The test for significance consisted of comparing the observed value of r_s with the critical value of r_s at the .05 level.

Criteria Tests

In addition to the statistical tests employed to evaluate the hypotheses and research question, practical decision rules were necessary. These decision rules (criteria tests) were used to determine if the results of the data analysis satisfied the research objectives.

Proposition 1 stated that attitudes of missile combat crew members toward their job and toward the missile career field continue to differ from one Minuteman wing to another. The criteria tests for this proposition were based on the following two guidelines: (1) each of the hypotheses was considered to be of equal importance, and (2) a statistically significant difference in at least 8 of the 15 MCCM attitude measures constituted practical support for this proposition. Rank orders for the wings were assigned based on a difference in mean rank value exceeding four points. Tied ranks were assigned for differences less than or equal to four points. If two or more mean ranks fell within a \pm four point interval of another mean rank, tied ranks were assigned to all these values.

Hypothesis 16 stated that for those attitudinal variables which differ from one wing to another, the differences are systematic. The criteria test for this hypothesis was based on the amount of agreement in the rank ordering of the wings on those attitudinal measures in which significant differences were found among the wings.

The Kendall coefficient of concordance test, with $\alpha = .05$, was used to determine whether or not the rankings were similar. A final rank ordering of the wings was determined using the results of the Kendall test and the guideline that a mean rank difference greater than one point must exist between wings. Tied ranks were assigned in the event mean rank differences did not exceed one point.

Proposition 2 stated that the attitudes of missile combat crew members toward their job and toward the missile career field have changed since May 1976. The criteria test for this proposition was based on the amount of agreement in the response distributions for each wing's 15 attitude measures from the 1976 and 1978 surveys. The Mann-Whitney U test, with $\alpha = .05$, was used to determine whether or not the response distributions were similar. A statistically significant difference in at least 8 of the 15 MCCM attitude measures constituted practical support for this proposition.

Proposition 3 stated that there is a difference in operations performance from one Minuteman wing to another. The criteria tests for this proposition employed the following two guidelines: (1) at least a two point performance index difference existed between wings, and (2) for a given year, at least three wings were not tied in rank, based on the performance index. The requirement for a two-point performance index difference reduced the probability that

an excessive number of wings were tied in rank for any given year. The Kruskal-Wallis test, with $\alpha = .05$, was used to determine whether or not differences in performance occurred among the six wings over time.

As noted previously, subsequent analysis precluded application of the Spearman correlation procedure, as originally intended, to answer the Research Question, "Do changes in attitude precede, coincide, or follow changes in Minuteman wing operations performance?" Hence, the information concerning the related criteria test is outlined only for purposes of highlighting the planned methodology and as a reference for future research. The attitude measures ranking were to be compared to the performance measures ranking for the periods before, during, and after the periods during which the attitude surveys were conducted to determine which pairs of attitude and performance measures rankings had the greatest amount of correlation. A Spearman rank correlation coefficient: r_s greater than 0.3 would have provided support for further research (23:48).

Summary of Assumptions and Limitations

Assumptions

1. Responses to the 1976 and 1978 attitude surveys represented the honest opinions of the MCCM respondents.
2. Any bias in the 1978 data, due to nonrespondents, was the same as the bias in the 1976 data; therefore,

the two data bases could be compared without limitation in terms of the distribution of responses to individual questions.

3. Data produced by questions 22 and 24 from the 1978 Engel and O'Neill survey questionnaire were considered ordinal level.

4. SAC IG and 3901 SMES ratings were administered impartially and consistently.

5. Changes in IG and 3901 SMES rating criteria were equally distributed across Minuteman wings in the year of the change and did not affect relative wing performance rankings.

6. The performance indices accurately reflected wing operations performance.

Limitations

1. The subjects of this study were limited to the six Minuteman wings and their respective crew members.

2. Measures of MCCM attitudes were limited to the 1976 and 1978 surveys.

3. Measures of wing performance were limited to the results of the IG and 3901 SMES inspections for the period 1974-1978.

CHAPTER III

DATA ANALYSIS

Introduction

This chapter summarizes the results of the data analysis conducted during this research to answer the research propositions, hypotheses, and question formulated to satisfy the research objectives listed in Chapter I.

Presentation Format

The presentation of the data analysis will be organized in numerical order by proposition followed by a discussion of the research question. The analysis of the hypotheses will be presented according to the following format:

1. A statement of the hypothesis.
2. A statement of the survey question and possible responses to the question (where applicable).
3. A statement of the findings of the statistical test relative to statistical significance and proposition support.
4. A table will be used to present the results of the statistical test conducted at the $\alpha = .05$ level. Where applicable, the table will contain the sample size and the

rank order of the wings based on the mean values obtained from the test results.

5. Comments will be made to highlight observations or to note key relationships.¹

The rankings established by the Kruskal-Wallis test were based on the computed mean value of responses for each wing. With the exception of question 26, a lower mean value was indicative of a more favorable response by a wing to the survey question. For question 26, the situation was exactly reversed; that is, a higher mean value was indicative of a more favorable response. For those cases where mean values were relatively close, the wings were assigned tied ranks. Thus, the rank ordering of the wing takes into account that differences in mean value may not necessarily indicate absolute differences in attitudes. The rankings of those attitudes determined to be statistically significant provided the input data for the Kendall Coefficient of Concordance test.

The rankings established by the Friedman two-way ANOVA test were determined by the computed mean ranking of the wing based on the performance indices for the years 1974 through 1978. A higher mean value was indicative of better performance by the wing. The ranks established by the Friedman test were not used for any purpose other than

¹See Appendices D and E for a breakdown of specific responses by question for each wing and in aggregate.

presentation of the test results and, therefore, no effort was made to account for identical or similar mean ranks.

The raw data for the performance indices are presented in Appendix B. The raw data for the Mann-Whitney response distribution comparisons as well as the complete test results comparisons are contained in Appendix D. The attitude and performance rankings used as input for the Spearman Rank Correlation test are contained in Appendix F.

Analysis

Proposition 1 (Hypotheses 1 through 15)

Attitudes of missile combat crew members toward their job and toward the missile career field continue to differ from one Minuteman wing to another.

Hypothesis 1. MCCMs' attitudes toward their job are not the same at all Minuteman wings.

1. Survey Question 18. Do you like your job?

- a. A definite yes
- b. A qualified yes
- c. Neutral
- d. A qualified no
- e. A definite no

2. Findings

- a. Test Results: Table 3-1
- b. Significance: Is statistically significant
- c. Support: Does offer practical support

3. Comments

Quite clearly, the most notable observation was the contrast in responses between F.E. Warren and the other

TABLE 3-1

GENERAL JOB ATTITUDE
(KRUSKAL-WALLIS TEST)
N=265

Rank Order	Wing	Mean Rank	Number in Sample
1	Ellsworth	101.8	53
3	Minot	116.6	46
3	Malmstrom	118.5	40
3	Whiteman	119.6	34
5	Grand Forks	145.4	32
6	F.E. Warren	183.7	60

Computed $\chi^2 = 43.4517$; d.f. = 5; $p < .0001$.

five Minuteman wings. Nearly 67 percent of F.E. Warren respondents expressed conditional or definite dissatisfaction with their jobs versus a scant 13 percent for Ellsworth respondents. Only Grand Forks even approached F.E. Warren with 46 percent of respondents expressing some degree of dislike (a qualified or definite no response) for their jobs.

Hypothesis 2. MCCMs' attitudes toward the manner in which they are supervised by their immediate supervisor are not the same at all Minuteman wings.

1. Survey Question 12. Are you supervised by your immediate supervisor in a manner which is satisfactory to you?

- a. A definite yes
- b. A qualified yes
- c. Neutral
- d. A qualified no
- e. A definite no

2. Findings

- a. Test Results: Table 3-2
- b. Significance: Is not statistically significant
- c. Support: Does not offer practical support

TABLE 3-2

SATISFACTION WITH SUPERVISION
(KRUSKAL-WALLIS TEST)
N=265

Rank Order	Wing	Mean Rank	Number in Sample
1.5	Grand Forks	120.0	32
1.5	Ellsworth	120.8	53
3	Minot	131.9	46
4	F.E. Warren	137.0	60
5	Malmstrom	141.5	40
6	Whiteman	148.7	34

Computed $\chi^2 = 5.0387$; d.f. = 5; p = .4112.

3. Comments

Overall, 80 percent of respondents expressed satisfaction with their immediate supervisor. While the degree of satisfaction, as indicated by a definite or qualified yes response, varied from wing to wing, no statistically discernible difference was noted nor was any response pattern evident.

Hypothesis 3. MCCMs' attitudes toward the sense of personal accomplishment they achieve in performing their jobs are not the same at all Minuteman wings.

1. Survey Question 15. Do you feel a sense of personal accomplishment when performing your job?

- a. A definite yes
- b. A qualified yes
- c. Neutral
- d. A qualified no
- e. A definite no

2. Findings

- a. Test Results: Table 3-3
- b. Significance: Is statistically significant
- c. Support: Does offer practical support

TABLE 3-3

SENSE OF ACCOMPLISHMENT
(KRUSKAL-WALLIS TEST)
N=265

Rank Order	Wing	Mean Rank	Number in Sample
1	Ellsworth	111.8	53
3.5	Minot	118.9	46
3.5	Malmstrom	120.7	40
3.5	Grand Forks	122.7	32
3.5	Whiteman	125.3	34
6	F.E. Warren	180.5	60

Computed $\chi^2 = 32.8731$; d.f. = 5; $p < .0001$.

3. Comments

Once again, the contrast between F.E. Warren and the other five wings is quite marked. Fifty-eight percent of F.E. Warren respondents indicated little or no sense of job-related personal accomplishment. In fact,

50 percent of all Minuteman respondents who selected a definite no as their response to this question were from F.E. Warren.

Hypothesis 4. MCCMs' attitudes toward the opportunity for individual recognition provided by their job are not the same at all Minuteman wings.

1. Survey Question 21. Does your job offer you a reasonable opportunity for individual recognition?

- a. A definite yes
- b. A qualified yes
- c. Neutral
- d. A qualified no
- e. A definite no

2. Findings

- a. Test Results: Table 3-4
- b. Significance: Is statistically significant
- c. Support: Does offer practical support

TABLE 3-4

OPPORTUNITY FOR RECOGNITION
(KRUSKAL-WALLIS TEST)
N=265

Rank Order	Wing	Mean Rank	Number in Sample
1	Ellsworth	96.7	53
3	Minot	128.3	46
3	Malmstrom	130.3	40
3	Grand Forks	131.6	32
5	Whiteman	139.0	34
6	F.E. Warren	167.8	60

Computed $\chi^2 = 27.2935$; d.f. = 5; p = .0001.

3. Comments

Over 80 percent of Ellsworth crew members responded favorably (a definite or qualified yes) to this question while F.E. Warren respondents tallied only 35 percent favorable responses. These figures compare to a 55 percent favorable response rate overall. Once again, these two wings occupied extremes of the spectrum with the remaining wings clustered between.

Hypothesis 5. MCCMs' attitudes toward the actual work involved in accomplishing their jobs are not the same at all Minuteman wings.

1. Survey Question 14. Do you enjoy doing the actual work involved in accomplishing your job?

- a. A definite yes
- b. A qualified yes
- c. Neutral
- d. A qualified no
- e. A definite no

2. Findings

- a. Test Results: Table 3-5
- b. Significance: Is statistically significant
- c. Support: Does offer practical support

3. Comments

Ellsworth respondents led the way with 72 percent of MCCMs answering with a definite or qualified yes. F.E. Warren MCCMs expressed the least enjoyment in doing the actual work involved in accomplishing the job with 47 percent selecting a negative response. Fifty-two percent

TABLE 3-5
ATTITUDE TOWARD WORK
(KRUSKAL-WALLIS TEST)
N=265

Rank Order	Wing	Mean Rank	Number in Sample
1	Ellsworth	106.8	53
2	Whiteman	115.4	34
3	Minot	121.3	46
4	Malmstrom	128.6	40
5	Grand Forks	134.0	32
6	F.E. Warren	177.5	60

Computed $\chi^2 = 31.6764$; d.f. = 5; $p < .0001$.

of all Minuteman respondents selecting a definite no were from F.E. Warren.

Hypothesis 6. MCCMs' attitudes toward the feeling of individual responsibility allowed by their job are not the same at all Minuteman wings.

1. Survey Question 13. Do you feel that you are given adequate responsibility in your job?

- a. A definite yes
- b. A qualified yes
- c. Neutral
- d. A qualified no
- e. A definite no

2. Findings

- a. Test Results: Table 3-6
- b. Significance: Is statistically significant
- c. Support: Does offer practical support

TABLE 3-6
INDIVIDUAL RESPONSIBILITY
(KRUSKAL-WALLIS TEST)
N=265

Rank Order	Wing	Mean Rank	Number in Sample
1.5	Ellsworth	114.8	53
1.5	Minot	117.8	46
3.5	Whiteman	124.3	34
3.5	Malmstrom	126.5	40
5	Grand Forks	135.4	32
6	F.E. Warren	168.7	60

Computed $\chi^2 = 20.4106$; d.f. = 5; p = .0010.

3. Comments

Eighty-seven percent of Ellsworth respondents replied with a definite or qualified yes versus a 67 percent favorable response figure for all wings combined.

Hypothesis 7. MCCMs' attitudes toward their work schedules are not the same at all Minuteman wings.

1. Survey Question 20. Are you satisfied with your work schedule?

- a. A definite yes
- b. A qualified yes
- c. Neutral
- d. A qualified no
- e. A definite no

2. Findings

- a. Test Results: Table 3-7
- b. Significance: Is statistically significant
- c. Support: Does offer practical support

TABLE 3-7
WORK SCHEDULE
(KRUSKAL-WALLIS TEST)
N=265

Rank Order	Wing	Mean Rank	Number in Sample
1	Ellsworth	83.6	53
2	Malmstrom	116.4	40
3.5	Minot	134.1	46
3.5	Grand Forks	137.5	32
5	Whiteman	154.4	34
6	F.E. Warren	172.3	60

Computed $\chi^2 = 45.0785$; d.f. = 5; $p < .0001$.

3. Comments

Offsetting the contrast in responses between Ellsworth and the other five wings were the nearly 20 percent of Minuteman respondents who remained neutral on this question. Negative response rates ranged from a low of 10 percent for Ellsworth respondents to a high of 70 percent for F.E. Warren respondents. Ellsworth respondents paced the other wings with a favorable response figure of 64 percent. Overall, however, only 38 percent of respondents expressed favorable feelings about their work schedule.

Hypothesis 8. MCCMs' attitudes toward the opportunity provided by their job to develop personal friendships are not the same at all Minuteman wings.

1. Survey Question 16. Does your job provide you with ample opportunity to develop personal friendships with other officers in your unit?

- a. A definite yes
- b. A qualified yes
- c. Neutral
- d. A qualified no
- e. A definite no

2. Findings

- a. Test Results: Table 3-8
- b. Significance: Is statistically significant
- c. Support: Does offer practical support

TABLE 3-8

PERSONAL FRIENDSHIPS
(KRUSKAL-WALLIS TEST)
N=265

Rank Order	Wing	Mean Rank	Number in Sample
2	Ellsworth	117.0	53
2	Malmstrom	117.2	40
2	Minot	120.0	46
5	Grant Forks	145.1	32
5	Whiteman	148.4	34
5	F.E. Warren	152.4	60

Computed $\chi^2 = 12.8036$; d.f. = 5; p = .0253.

3. Comments

This question appeared to split the wings into two distinct groups with Ellsworth, Malmstrom, and Minot displaying the more favorable feelings toward the opportunity to developing friendships. Collectively, the wings expressed positive feelings with approximately 75 percent of MCCMs responding with a definite or qualified yes.

Hypothesis 9. MCCMs' attitudes toward the physical working environment of the Launch Control Center are not the same at all Minuteman wings.

1. Survey Question 17. Do you consider the physical working environment of the capsule (LCC) to be satisfactory?

- a. A definite yes
- b. A qualified yes
- c. Neutral
- d. A qualified no
- e. A definite no

2. Findings

- a. Test Results: Table 3-9
- b. Significance: Is statistically significant
- c. Support: Does offer practical support

TABLE 3-9

PHYSICAL WORK ENVIRONMENT
(KRUSKAL-WALLIS TEST)
N=265

Rank Order	Wing	Mean Rank	Number in Sample
1	Ellsworth	92.6	53
2	Minot	120.5	46
3	Malmstrom	124.9	40
4	Whiteman	141.0	34
5	F.E. Warren	155.5	60
6	Grand Forks	177.2	32

Computed $\chi^2 = 34.8721$; d.f. = 5; $p < .0001$.

3. Comments

Collectively, only one-third of the respondents expressed satisfaction with the physical working environment.

While Ellsworth respondents had the lowest percentage of negative responses at 30 percent, nearly one-third of the wing's respondents remained neutral. Notably, Grand Forks replaced F.E. Warren as the wing with the poorest perception of the variable under question. Grand Forks had no respondents selecting a definite yes while nearly 80 percent answered with a definite or qualified no. This is somewhat surprising since the launch control capsules located at Grand Forks provide a larger work area than the capsules at other Minuteman wings.

Hypothesis 10. MCCMs' attitudes toward the effect that their jobs have on their personal lives are not the same at all Minuteman wings.

1. Survey Question 19. Does your job have a favorable effect on your personal life?

- a. A definite yes
- b. A qualified yes
- c. Neutral
- d. A qualified no
- e. A definite no

2. Findings

- a. Test Results: Table 3-10
- b. Significance: Is statistically significant
- c. Support: Does offer practical support

3. Comments

Nearly 25 percent of Minuteman respondents remained neutral on this question tending to diminish somewhat the contrast between the groups of Ellsworth-Minot-Malmstrom and F.E. Warren-Whiteman-Grand Forks. The former

TABLE 3-10

EFFECT ON PERSONAL LIFE
(KRUSKAL-WALLIS TEST)
N=265

Rank Order	Wing	Mean Rank	Number in Sample
1	Ellsworth	95.6	53
2	Minot	111.6	46
3	Malmstrom	124.8	40
4.5	Grand Forks	154.2	32
4.5	Whiteman	154.7	34
6	F.E. Warren	164.3	60

Computed $\chi^2 = 33.7701$; d.f. = 5; $p < .0001$.

displayed the more positive perception of the effect of the job on personal life. Among the latter group, 47 percent of Whiteman respondents replied with a definite no and 73 percent of F.E. Warren respondents selected either a definite or qualified no.

Hypothesis 11. MCCMs' attitudes toward the opportunity for advancement provided by the missile operations career field are not the same at all Minuteman wings.

1. Survey Question 27. Do you think the opportunity for advancement in the missile operations career field is at least as good as other Air Force career fields?

- a. A definite yes
- b. A qualified yes
- c. Neutral
- d. A qualified no
- e. A definite no

2. Findings

- a. Test Results: Table 3-11
- b. Significance: Is statistically significant
- c. Does offer practical support

TABLE 3-11

OPPORTUNITY FOR ADVANCEMENT
(KRUSKAL-WALLIS TEST)
N=265

Rank Order	Wing	Mean Rank	Number in Sample
1	Malmstrom	108.9	40
3	Ellsworth	125.0	53
3	Minot	127.6	46
3	Grand Forks	129.8	32
5	Whiteman	145.0	34
6	F.E. Warren	155.2	60

Computed $\chi^2 = 11.5156$; d.f. = 5; p = .0421.

3. Comments

Malmstrom paced the wings with 65 percent of MCCMs selecting a favorable response. This compared with a 51 percent favorable response rate for runner-up Ellsworth. Despite this contrast, the overall spread in responses among the wings barely discerned a statistically significant difference.

Hypothesis 12. MCCMs attitudes toward the missile operations career field are not the same at all Minuteman wings.

1. Survey Question 26. Which of the following best describes your feelings about the missile operations career field?

- a. It's a dead end
- b. It's a career field with some future
- c. It's a career field with a very promising future

2. Findings

- a. Test Results: Table 3-12
- b. Significance: Is statistically significant
- c. Support: Does offer practical support

TABLE 3-12

CAREER FIELD FUTURE
(KRUSKAL-WALLIS TEST)
N=264

Rank Order	Wing	Mean Rank	Number in Sample
1.5	Minot	154.4	46
1.5	Grand Forks	152.2	32
3	Malmstrom	145.3	40
4	Ellsworth	132.0	52
5	Whiteman	121.4	34
6	F.E. Warren	103.4	60

Computed $\chi^2 = 20.7346$; d.f. = 5; p = .0009.

3. Comments

It is interesting to note that the two reputedly most undesirable bases at which to be stationed, Minot and Grand Forks, led the way on this question with 39 and 31 percent of respondents, respectively, indicating they felt

the career field offered a very promising future. Overall, 57 percent of respondents felt the career field had some future. Somewhat peculiar was the seeming inconsistency in response between this question and question 27. Minot and Grand Forks respondents gave only moderate marks to opportunity for advancement in question 27 while expressing the most optimism for the future of the career field in question 26.

Hypothesis 13. MCCMs' attitudes toward the adequacy of efforts to improve missile crew duty and to resolve problems generally encountered by MCCMs are not the same at all Minuteman wings.

1. Survey Question 31. Do you feel that adequate efforts have been made to improve missile crew duty and to resolve problems generally encountered by missile crew members?

- a. A definite yes
- b. A qualified yes
- c. Neutral
- d. A qualified no
- e. A definite no

2. Findings

- a. Test Results: Table 3-13
- b. Significance: Is statistically significant
- c. Support: Does offer practical support

3. Comments

Collectively, 60 percent of respondents felt adequate efforts had not been made to improve crew duty. F.E. Warren and Grand Forks led the critical responses with 80 percent of MCCMs selecting a qualified or definite no response. This compares with only 43 percent dissatisfied

TABLE 3-13
EFFORTS TO IMPROVE DUTY
(KRUSKAL-WALLIS TEST)
N=265

Rank Order	Wing	Mean Rank	Number in Sample
1	Ellsworth	102.7	53
2	Malmstrom	115.6	40
3	Minot	122.2	46
4	Whiteman	134.4	34
5.5	F.E. Warren	162.2	60
5.5	Grand Forks	164.3	32

Computed $\chi^2 = 27.3242$; d.f. = 5; p = .0001.

Ellsworth respondents. Once again, though, a large contingent of Ellsworth respondents (33 percent) remained neutral.

Hypothesis 14. MCCMs' attitudes toward the understanding of missile crew duty displayed by command and staff personnel at higher headquarters are not the same at all Minuteman wings.

1. Survey Question 24. Do you feel that missile crew duty is fully understood and appreciated by command and staff personnel at higher headquarters?

- a. Yes
- b. No

2. Findings

- a. Test Results: Table 3-14
- b. Significance: Is statistically significant
- c. Support: Does offer practical support

TABLE 3-14

HIGHER HQ UNDERSTANDING
(KRUSKAL-WALLIS TEST)
N=263

Rank Order	Wing	Mean Rank	Number in Sample
1	Ellsworth	112.1	52
2	Malmstrom	124.5	40
3.5	Grand Forks	135.2	32
3.5	Minot	136.1	46
5.5	F.E. Warren	143.0	59
5.5	Whiteman	143.6	34

Computed $\chi^2 = 19.7992$; d.f. = 5; p = .0014.

3. Comments

Overall, nearly 90 percent of respondents indicated they did not feel HHQ command and staff personnel fully understood and appreciated missile crew duty. The critical response was led by Whiteman, F.E. Warren, and Minot with 97, 95, and 91 percent, respectively, selecting either a definite or qualified no.

Hypothesis 15. MCCMs attitudes toward the understanding of missile crew duty displayed by command and staff personnel in their unit are not the same at all Minuteman wings.

1. Survey Question 22. Do you feel that missile crew duty is fully understood and appreciated by senior command and staff personnel in your unit?

- a. Yes
- b. No

2. Findings

- a. Test Results: Table 3-15
- b. Significance: Is statistically significant
- c. Support: Does offer practical support

TABLE 3-15

UNIT STAFF UNDERSTANDING
(KRUSKAL-WALLIS TEST)
N=265

Rank Order	Wing	Mean Rank	Number in Sample
1.5	Malmstrom	103.2	40
1.5	Ellsworth	103.5	53
3	Grand Forks	128.0	32
4	Whiteman	143.1	34
5	Minot	148.6	46
6	F.E. Warren	163.9	60

Computed $\chi^2 = 36.5141$; d.f. = 5; $p < .0001$.

3. Comments

Once again, the majority of Minuteman respondents (60 percent) did not feel crew duty was adequately appreciated by unit senior command and staff personnel. As with the previous question (Hypothesis 15) F.E. Warren, Minot, and Whiteman produced the largest percentages of negative (definite or qualified no) respondents with 83, 72, and 68 percent, respectively.

4. Conclusion

The results of testing hypotheses 1 through 15, summarized in Table 3-16 offer support to the proposition that MCCM attitudes are not the same at all Minuteman wings. Only one (satisfaction with supervision) of the fifteen attitudinal variables measured did not display a statistically discernible difference among the wings. In most cases, it appeared that the statistical significance was linked to the marked contrast in response between MCCMs from Ellsworth and F.E. Warren. On eleven of the fifteen questions, Ellsworth MCCMs either tied for or singularly displayed the most positive attitude (via their favorable survey responses). Conversely, F.E. Warren MCCMs either tied for or singularly displayed the most negative attitude on all but one question. No single variable or thread linking a group of variables appeared to offer adequate explanation for the disparity in response between these two wings.

Subsequent runs of the Kruskal-Wallis tests, removing first F.E. Warren respondents, then Ellsworth, and finally both, tended to confirm this observation. Results are highlighted in Appendix C. With F.E. Warren responses omitted, only seven of the fifteen questions produced significant differences. With Ellsworth removed, the number of statistically significant questions rose to twelve. With both wings removed, only four questions revealed a significant difference in attitudes among the remaining wings.

AD-A075 591

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH SCHOOL--ETC F/G 5/10
A STUDY OF THE RELATIONSHIP BETWEEN ATTITUDES OF MISSILE COMBAT--ETC(U)
SEP 79 R J ANARDE , D H BELL
AFIT-LSSR-6-79B

UNCLASSIFIED

2 OF 2
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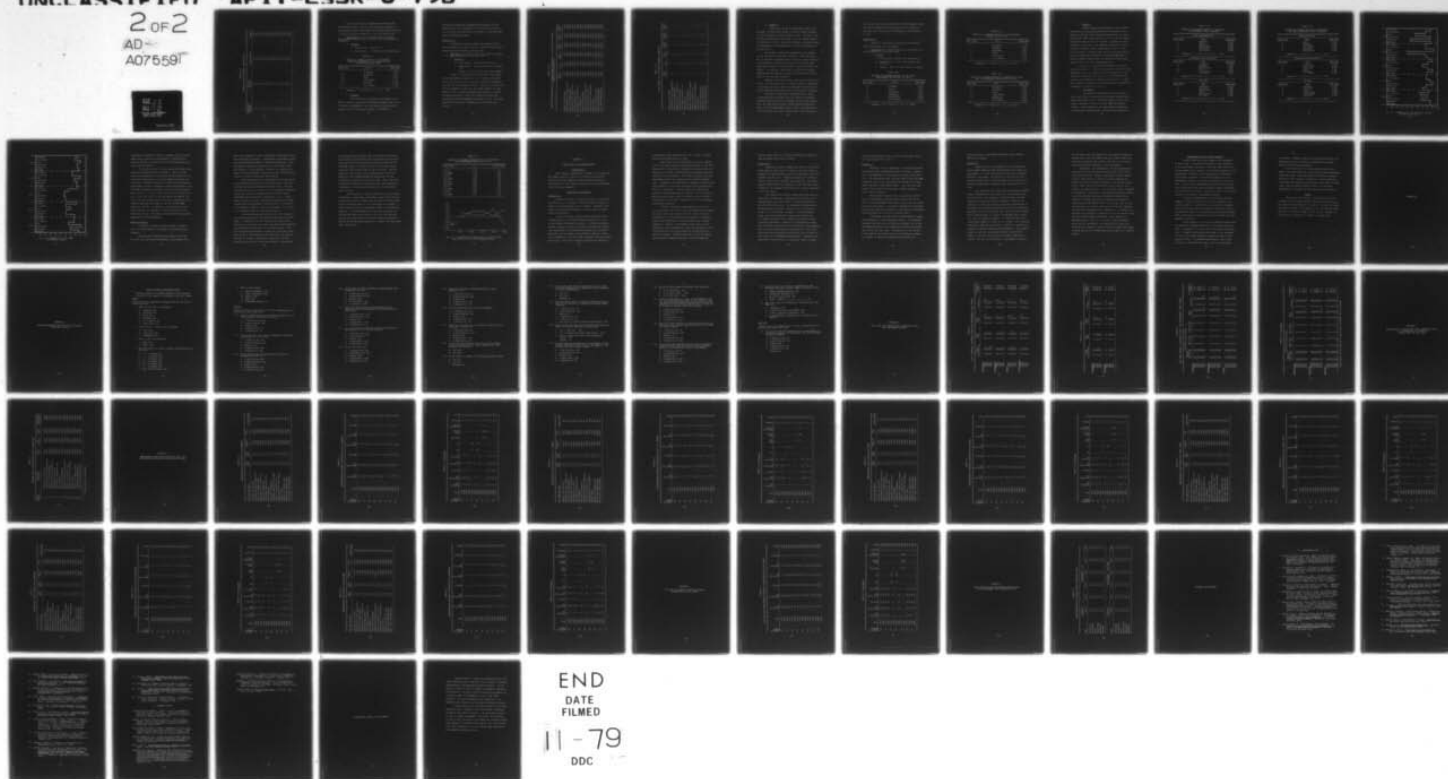


TABLE 3-16
HYPOTHESIS TEST RESULTS--PROPOSITION 1

Hypothesis Number	Question Number	Significance	Support
1	18	Yes	Yes
2	12	No	No
3	15	Yes	Yes
4	21	Yes	Yes
5	14	Yes	Yes
6	13	Yes	Yes
7	20	Yes	Yes
8	16	Yes	Yes
9	17	Yes	Yes
10	19	Yes	Yes
11	27	Yes	Yes
12	26	Yes	Yes
13	31	Yes	Yes
14	24	Yes	Yes
15	22	Yes	Yes

Along with Ellsworth respondents, Malmstrom and Minot MCCMs tended to provide more favorable responses to the questions while Grand Forks and Whiteman MCCMs displayed a relatively poorer perception of job and career field.

Hypothesis 16 For those attitudinal variables which differ from one wing to another, the differences are systematic.

1. Findings

- a. Test Results: Table 3-17
- b. Significance: Is statistically significant

TABLE 3-17

RESULTS OF KENDALL ANALYSIS OF ATTITUDINAL
VARIABLES DETERMINED TO BE SIGNIFICANT BY
THE KRUSKAL-WALLIS TESTS

Rank Order	Wing	Mean Rank
1	Ellsworth	1.500
2.5	Malmstrom	2.571
2.5	Minot	2.821
4.5	Grand Forks	4.071
4.5	Whiteman	4.250
6	F.E. Warren	5.786

Computed $\chi^2 = 49.9220$; d.f. = 5; $p < .0001$.

2. Comments

For the fourteen significant attitudinal variables, there are systematic differences between wings; that is, there is agreement in the rank ordering of wings with respect to the attitudinal variables. The MCCMs at

Ellsworth consistently responded more favorably to the questionnaire than the MCCMs at F.E. Warren with similar yet not quite as significant differences in response found among the remaining wings.

Proposition 2

Attitudes of missile combat crew members within each Minuteman wing toward their job and toward the missile career field have changed since May 1976.

Hypothesis 17. Within each wing, MCCMs' attitudes in 1978 are not the same as those in 1976.

1. Findings

- a. Test Results: Tables 3-18 and 3-19
- b. Significance: Is not statistically significant
- c. Support: Does not offer practical support

Table 3-18 contains the significance levels found by the Mann-Whitney comparison of the response distributions for each of the 15 attitudinal variables examined in the 1976 and 1978 research studies. Table 3-19 contains the relative movement of the 1978 attitudes compared to those found in 1976. Positive movement was indicative of more favorable attitude in 1978 while negative movement was indicative of more unfavorable attitude in 1978. For those cases where there was no movement, the attitudes were similar.

TABLE 3-18

TWO-TAIL PROBABILITIES OF MANN-WHITNEY COMPARISON OF 1978 AND 1976 SURVEY
RESPONSE DISTRIBUTIONS

	Ells- worth	Minot	F.E. Warren	Grand- Forks	Malm- strom	White- man
General job attitude	.7511	.5271	.2477	.8335	.9166	.2477
Satisfaction with supervision	1.0000	.4020	.5296	.5959	.7540	.4620
Sense of accomplishment	.9166	.9163	.4647	.7511	.7480	.9193
Opportunity for recognition	.3961	.4620	.2087	.9166	.7540	.9163
Attitude toward work	.7533	1.0000	.0927	.5959	.5993	.5271
Individual responsibility	.5993	.9166	.1425	.8320	.8340	.5245
Work schedule	.9161	.4592	.2948	.7503	.7540	.6004
Personal friendships	.6742	.4620	.0917	1.0000	1.0000	.6742
Physical working environment	.8340	.6752	.3457	.5284	.5271	.2933
Effect on personal life	.7511	.5947	.5296	.9161	.3961	.4620
Opportunity for advancement	.9168	.9166	.0259	.5959	.5900	.4020
Career field	.8273	.5127	.5127	.5127	1.0000	.8248
Efforts to improve duty	.6016	.5959	1.0000	1.0000	.6004	.5959
Higher HQ understanding	.6831	1.0000	1.0000	1.0000	1.0000	.4386
Unit staff understanding	.4386	1.0000	1.0000	1.0000	.6831	.4386

TABLE 3-19
1978 VERSUS 1976 ATTITUDE MOVEMENT DIRECTION

	Ells- worth	Minot	F.E. Warren	Grand- Forks	Malm- strom	White- man
General job attitude	-	+	+	-	+	-
Satisfaction with supervision	0	+	+	-	+	-
Sense of accomplishment	-	-	+	-	+	-
Opportunity for recognition	-	+	+	-	+	-
Attitude toward work	+	0	+	-	+	-
Individual responsibility	-	+	+	-	-	-
Work schedule	-	+	+	+	+	-
Personal friendships	-	+	+	0	0	-
Physical working environment	+	+	+	-	+	-
Effect on personal life	+	+	+	-	+	-
Opportunity for advancement	-	+	+	+	-	-
Career field	-	-	-	-	0	+
Efforts to improve duty	+	+	+	0	+	-
Higher HQ understanding	+	0	0	0	0	-
Unit staff understanding	+	0	0	0	+	-

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2. Comments

Within each of the six Minuteman wings, there has been no significant change in MCCM attitudes surveyed in 1978 compared to those surveyed in 1976. Of the 15 comparisons conducted for each wing, only F.E. Warren showed a significant (.0259), unfavorable change in attitude toward the opportunity for advancement in the missile operations career field.

No movement trends were established with respect to the individual attitudinal variables. That is, there was no unanimous agreement among the wings, either favorable or unfavorable, concerning the changes in attitude even among those found to be significant force-wide by Engel and O'Neill. In addition, there were no generalized trends established with respect to either the career field variables or job attitude variables.

Movement trends were established within three of the wings. For the most part, F.E. Warren and Minot displayed a consistent positive trend while Whiteman displayed a consistent negative trend across the 15 attitudinal variables.

The lack of significant change was most clearly evidenced by the fact that while F.E. Warren displayed a consistent positive trend in response distribution comparisons, the wing had the overall least favorable MCCM attitudes of all the Minuteman wings in 1978. The application of the criteria test used in this study to the rankings of

the nine missing wings by Cancellieri and Willoughby showed F.E. Warren shared the bottom position, with respect to attitude, with Grand Forks, Davis-Monthan, and Malmstrom in 1976.

Proposition 3

There is a difference in operations performance from one Minuteman wing to another.

Hypothesis 18. Missile operations performance is not the same at all Minuteman wings.

1. Findings

- a. Test Results: Tables 3-20 through 3-22
- b. Significance: Is not statistically significant
- c. Support: Does not offer practical support

TABLE 3-20

RESULTS OF FRIEDMAN ANALYSIS OF 3901 SMES
PERFORMANCE INDICES FOR 1974-1978

Rank Order	Wing	Mean Rank
1	Whiteman	4.600
2	Minot	3.800
3	Ellsworth	3.800
4	Malmstrom	3.000
5	Grand Forks	2.900
6	F.E. Warren	2.900

Computed $\chi^2 = 3.3714$; d.f. = 5; p = .6429.

TABLE 3-21
RESULTS OF FRIEDMAN ANALYSIS OF IG PERFORMANCE
INDICES FOR 1974-1978

Rank Order	Wing	Mean Rank
1	Ellsworth	4.100
2	Whiteman	3.900
3	Malmstrom	3.600
4	Minot	3.400
5	Grand Forks	3.400
6	F.E. Warren	2.600

Computed $\chi^2 = 1.9429$; d.f. = 5; p = .8570.

TABLE 3-22
RESULTS OF FRIEDMAN ANALYSIS OF COMBINED 3901 SMES
AND IG PERFORMANCE INDICES FOR 1974-1978

Rank Order	Wing	Mean Rank
1	Ellsworth	4.800
2	Whiteman	4.600
3	Minot	3.200
4	Grand Forks	3.000
5	Malmstrom	2.800
6	F.E. Warren	2.600

Computed $\chi^2 = 6.4857$; d.f. = 5; p = .2618.

2. Comments

Missile operations performance did not differ significantly from one Minuteman wing to another as evidenced by the relatively low significance levels of .6429 for the 3901 SMES inspections and .8570 for the IG inspections during the period 1974 to 1978. Although not statistically significant, the combined performance indices revealed a somewhat higher significance level of .2618 for the period. Although there was no statistical difference in performance, Whiteman and Ellsworth appeared to perform somewhat better than F.E. Warren and Grand Forks for both the IG and 3901 SMES inspections.

In order to insure that the performance indices were not biased as a result of the weights assigned to each performance area, an analysis of each component was conducted for the period 1974 to 1978. The results of this analysis are presented in Tables 3-23 and 3-24. In addition, graphical portrayals of the performance indices are contained in Figures 3-1 and 3-2.

3. Conclusions

The weighting system did not bias the data since there were no significant differences between wings during the period 1974 to 1978 with respect to the individual components of the IG and 3901 SMES performance indices. There appeared to be some extreme differences in performance indices within individual test groups as

TABLE 3-23

RESULTS OF FRIEDMAN ANALYSIS OF INDIVIDUAL
IG PERFORMANCE INDEX COMPONENTS

CREW PERFORMANCE/EWO		
<u>Rank Order</u>	<u>Wing</u>	<u>Mean Rank</u>
1	Whiteman	4.000
2	Minot	3.900
3	Ellsworth	3.600
4	Grand Forks	3.300
5	Malmstrom	3.200
6	F.E. Warren	3.000

Computed $\chi^2 = 1.1429$; d.f. = 5; p = .9502.

STANDARDIZATION/EVALUATION		
<u>Rank Order</u>	<u>Wing</u>	<u>Mean Rank</u>
1	Ellsworth	4.400
2	Whiteman	3.600
3	Grand Forks	3.600
4	Minot	3.500
5	F.E. Warren	3.000
6	Malmstrom	2.900

Computed $\chi^2 = 2.0571$; d.f. = 5; p = .8412

TRAINING		
<u>Rank Order</u>	<u>Wing</u>	<u>Mean Rank</u>
1	Malmstrom	4.800
2	Ellsworth	3.600
3	Grand Forks	3.600
4	Minot	3.400
5	F.E. Warren	3.000
6	Whiteman	2.600

Computed $\chi^2 = 3.9714$; d.f. = 5; p = .5535.

TABLE 3-24

RESULTS OF FRIEDMAN ANALYSIS OF INDIVIDUAL
3901 SMES PERFORMANCE INDEX COMPONENTS

CREW PROFICIENCY		
<u>Rank Order</u>	<u>Wing</u>	<u>Mean Rank</u>
1	Minot	4.500
2	Whiteman	4.200
3	Ellsworth	3.800
4	F.E. Warren	3.200
5	Malmstrom	3.100
6	Grand Forks	2.200

Computed $\chi^2 = 5.0286$; d.f. = 5; p = .4124

STANDARDIZATION/EVALUATION		
<u>Rank Order</u>	<u>Wing</u>	<u>Mean Rank</u>
1	Ellsworth	4.600
2	Grand Forks	4.400
3	Malmstrom	3.600
4	Minot	3.100
5	Whiteman	2.900
6	F.E. Warren	2.400

Computed $\chi^2 = 5.3714$; d.f. = 5; p = .3723.

TRAINING		
<u>Rank Order</u>	<u>Wing</u>	<u>Mean Rank</u>
1	Whiteman	4.800
2	Ellsworth	3.600
3	Minot	3.600
4	F.E. Warren	3.600
5	Grand Forks	3.200
6	Malmstrom	2.200

Computed $\chi^2 = 5.0000$; d.f. = 5; p = .4159.

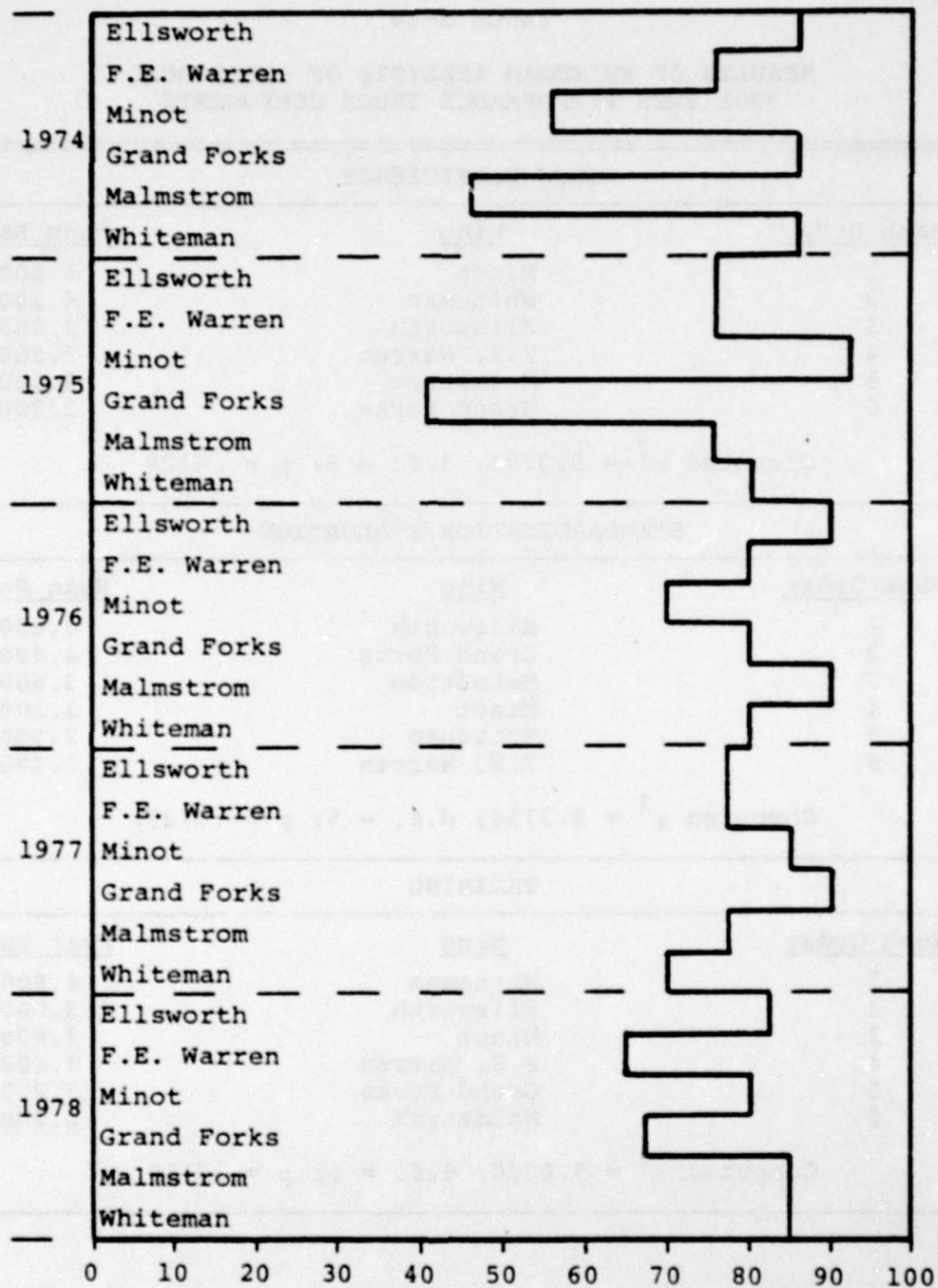


Fig. 3-1. Comparison of SAC Inspector General Performance Indices

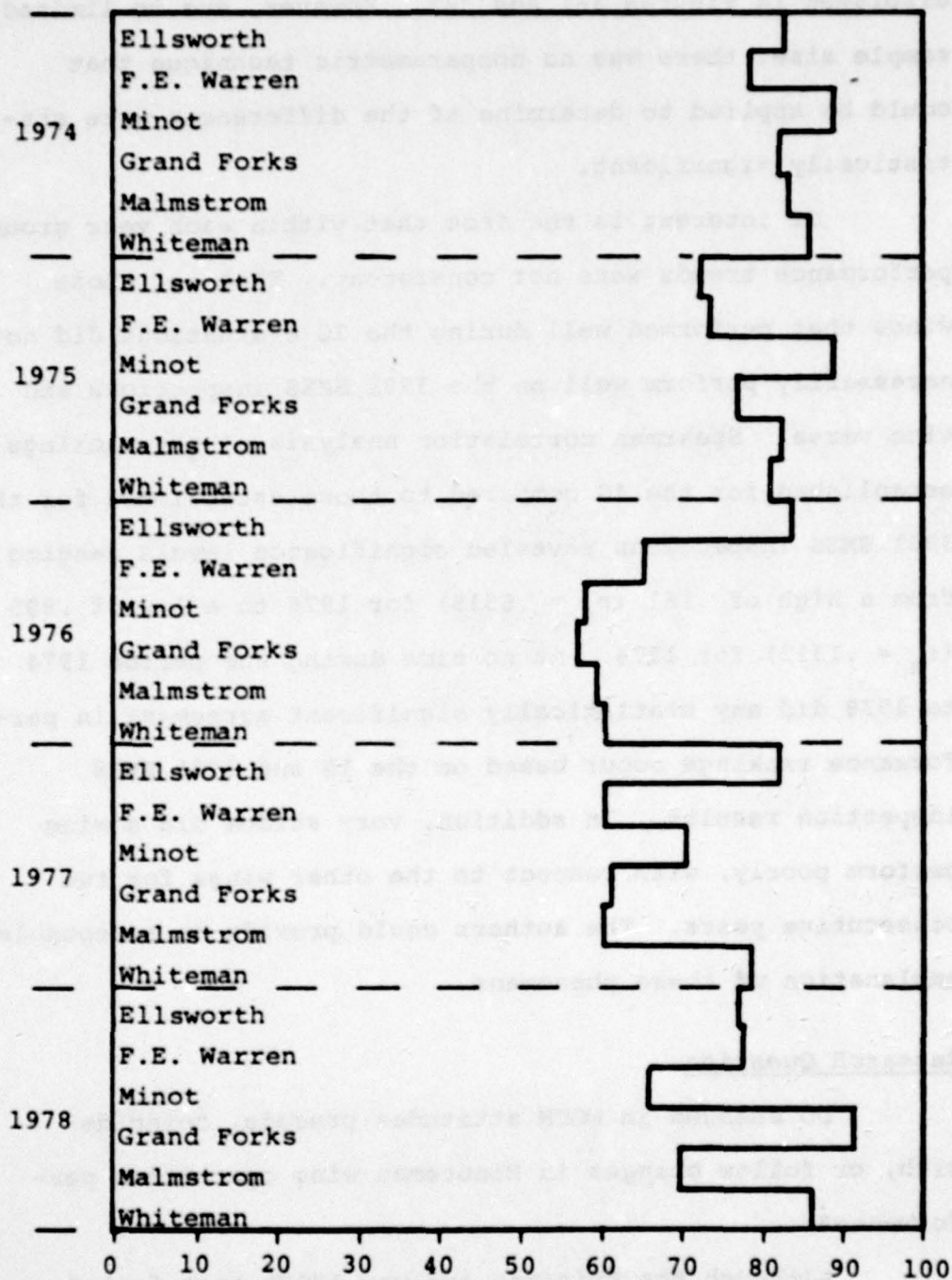


Fig. 3-2. Comparison of 3901 SMES Performance Indices

displayed in Figures 3-1 and 3-2. However, due to limited sample size, there was no nonparametric technique that could be applied to determine if the differences were statistically significant.

Of interest is the fact that within each year group, performance trends were not consistent. That is, those wings that performed well during the IG evaluations did not necessarily perform well on the 3901 SMES inspections and vice versa. Spearman correlation analysis of the rankings established for the IG compared to those established for the 3901 SMES inspections revealed significance levels ranging from a high of .161 ($r_s = .6515$) for 1976 to a low of .805 ($r_s = .1312$) for 1974. At no time during the period 1974 to 1978 did any statistically significant agreement in performance rankings occur based on the IG and 3901 SMES inspection results. In addition, very seldom did a wing perform poorly, with respect to the other wings for two consecutive years. The authors could provide no acceptable explanation of these phenomena.

Research Question

Do changes in MCCM attitudes precede, coincide with, or follow changes in Minuteman wing operations performance?

Although the Friedman two-way ANOVA test failed to reveal any significant differences in performance over

time, there appeared to exist performance differences within the individual year groups. Consequently, performance rankings were established based on observed differences in the performance indices and application of the criteria test with respect to tied rankings. However, any conclusions based on these performance rankings would be limited by the inability to prove statistical significance.

Attitude rankings were determined by the mean values of the Kendall Coefficient of Concordance test of the significant attitudinal differences between wings. The attitude rankings were correlated with the performance rankings through the use of the Spearman Rank Correlation test.

A Spearman Rank Correlation Coefficient: r_s of 1.0 indicates a perfect positive relationship between the attitude rankings and the performance rankings while a r_s value of -1.0 indicates a perfect inverse relationship. A r_s value of 0.0 indicates that no relationship exists.

The attitude rankings found in the 1977 analysis of the 1976 attitude survey included both Minuteman and Titan wings. In addition, the 1977 study did not assign tied rankings to wings with relatively close mean values obtained from the Kendall Coefficient of Concordance test. Since tied rankings were assigned to wings with relatively close mean values in the analysis of the 1978 data, the decision was made to conduct a statistical analysis of the 1976 survey results with the Titan data removed to insure that

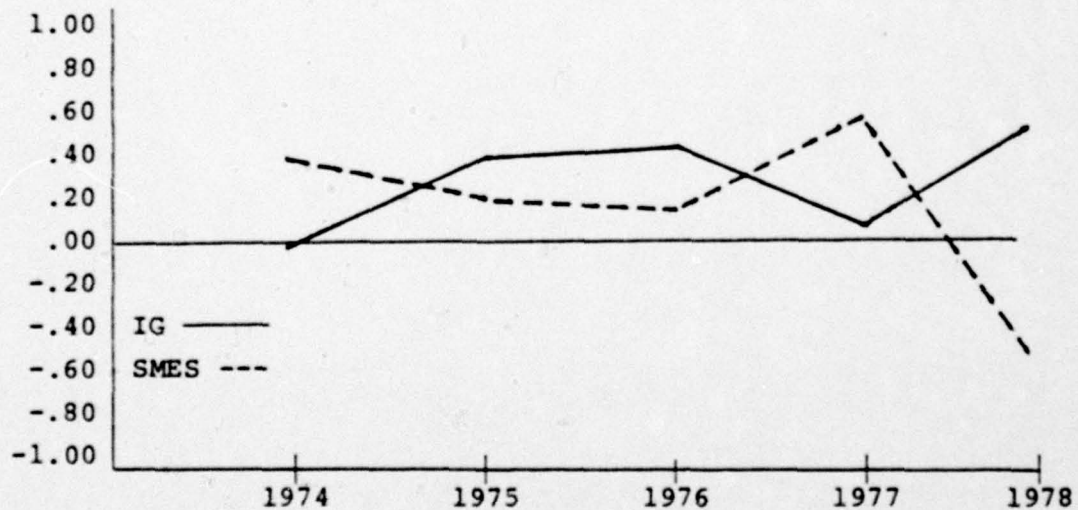
the Minuteman wing rankings were as accurate as possible. Test results indicated that there were significant differences for only three attitudinal variables among the six Minuteman wings in contrast to the nine variables noted among all nine missile wings in the 1977 study. For the most part, the contrast in attitudes between the Titan MCCMs and the Minuteman MCCMs was responsible for the differences identified in the 1977 study. Thus, there was insufficient support for the proposition that significant differences in attitude existed among the six Minuteman wings in 1976.

The inability to identify statistically significant differences in operations performance coupled with the discovery of the lack of significant attitude difference among the six Minuteman wings in 1976 prevented this research effort from providing a supportable answer to the research question. Since performance data was only available for the periods before and concurrent with the 1978 attitude survey, any answer based on the test results contained in Table 3-25 and depicted graphically in Figure 3-3 would have been inconclusive.

TABLE 3-25

RESULTS OF SPEARMAN CORRELATION OF 1978 ATTITUDES
WITH PERFORMANCE FROM 1974 TO 1978

Performance	r_s	Significance
1974-IG	-.0159	.977
1974-SMES	.3752	.464
1975-IG	.3482	.499
1975-SMES	.1818	.731
1976-IG	.4291	.396
1976-SMES	.1515	.775
1977-IG	.0625	.907
1977-SMES	.5628	.245
1978-IG	.5075	.305
1978-SMES	-.4777	.338

Fig. 3-3. Spearman Rank Correlation of 1978 Attitude
Ranks with 1974 to 1978 Performance Ranks

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents the findings of this research. The format used will consist of outlining the research objective and then summarizing the findings relating to that objective. The chapter concludes with some recommendations for future research.

Objectives and Findings

Objective 1a

Objective 1a was to analyze the results of the 1978 attitude survey to determine if MCCM attitudes continue to differ from one Minuteman wing to another. Research proposition 1 and research hypotheses 1-16 were used to accomplish this objective.

In the 1977 study, statistically significant differences among all nine SAC wings were observed for nine of the fifteen attitudinal variables. As noted previously, however, removal of Titan survey data revealed that significant differences in attitude existed among the six Minuteman wings for only three of the fifteen variables. There was no evidence in the 1977 study to suggest that this might be the case. Thus, this research objective was based on a

misconception that MCCM attitudes had, in fact, differed among the Minuteman wings in 1976.

Application of the Kruskal-Wallis one-way (ANOVA) test to the same fifteen attitudinal variables in the 1978 questionnaire revealed that statistically significant differences in attitude existed among the Minuteman wings for fourteen of the variables. This easily satisfied the pre-designated criteria for supporting the research proposition. In general, we noted that the apparent cause for the large number of significant variables was the extreme difference in responses to survey questions by MCCMs from Ellsworth versus MCCMs from F.E. Warren. The difference in MCCM attitude between these two wings accounted for the statistically significant findings for ten of the fourteen significant variables.

Following similarly predetermined criteria for using wing mean rank values, wing rank orders were assigned for each variable and constituted the input for testing Hypothesis 16. This hypothesis was designed to determine whether the differences in attitude noted were, indeed, systematic. Results of the Kendall Coefficient of Concordance: W test confirmed that there was agreement in the rank ordering of the wings across the significant attitudinal variables. Stated another way, across the board, the attitudes of MCCMs toward their job and toward the

missile career field in 1978 were significantly better at some Minuteman wings than at others.

Objective 1b

Objective 1b was to compare the results of the most recent MCCM attitude survey to those of the 1976 study to determine if MCCM attitudes within each Minuteman wing have changed since May 1976. Research proposition 2 and hypothesis 17 were used to satisfy this objective. The survey response distributions to questions in the 1978 study were compared to the response distributions to similar questions in the 1976 study.

The statistical analysis showed that there were no significant differences in response distributions within each Minuteman wing with respect to similar questions in the 1976 and 1978 surveys. No trends were established by consensus among the wings, either positive or negative, across the 15 attitudinal variables. Within Minuteman wings, positive distribution trends were exhibited by F.E. Warren and Minot with a negative distribution trend exhibited by Whiteman. However, the distribution trends were not always consistent with the findings of the comparisons of wing attitudes found by Objective 1a. The inconsistencies were attributed to the overall lack of significant change in the response distributions. Therefore, the researchers concluded that no significant change in MCCM

attitude had occurred within each of the Minuteman wings over the period 1976 to 1978.

Objective 2

Objective 2 was to determine if operations performance differs from one Minuteman wing to another. Proposition 3 and Hypothesis 18 were used to satisfy this objective. The performance data, obtained from IG and 3901 SMES inspection results for the period 1974 through 1978, were used to develop a performance index. This index was comprised of the inspection areas most closely related to actual MCCM performance.

The research revealed that no significant differences in performance occurred during the period 1974 to 1978. No wing performed consistently better than any other wing during the period. Available nonparametric techniques could not be applied to determine if performance differences existed between the wings for individual years.

Performance rankings were developed based on apparent differences in the performance indices. The rankings revealed that there was no correlation between the IG and 3901 SMES appraisals of Minuteman wing operations performance within any given year. In addition, at no time did a wing receive the lowest rank for two consecutive years. Any attempt to explain the apparent disparities and

inconsistencies in performance appraisals would require additional research.

Objective 3

Objective 3 was to determine if any relationship exists between MCCM attitude and Minuteman wing operations performance. In order to satisfy this objective, Research Question 1 was posed. The results of the 1976 and 1978 attitude surveys were to be correlated with the results of operations performance inspections for the period 1974 to 1978.

The revelation that there was no significant differences in Minuteman wing attitudes for 1976 prevented this research effort from completing the statistical analysis required to answer the research question. Further, the inability to find statistically significant differences in Minuteman wing operations performance would have seriously detracted from any conclusions that might have been reached had it been possible to conduct the Spearman Rank Correlation test as originally planned. In addition, the relatively small number of ranks (6) to be used in this analysis undoubtedly affected the ability to identify a significant correlation between attitude and performance. Any relative change in rank by a wing would have had a significant impact on the test results due to the small sample size. Finally, the lack of consistency in performance exhibited

by the wings over time coupled with the apparent disparity between the IG and 3901 SMES inspection results within any given year suggested that perhaps they may not have been the most meaningful measures of unit performance.

Obviously, wing performance on higher headquarters inspections is not the single driving factor that influences wing attitude. However, performance results impact across a wide variety of factors found by Ashbaugh and Godfrey to have a negative influence on the missile career field. These factors include such areas as policy, procedures, and administration. This research effort attempted to determine if there was a link between performance differences and attitude differences between Minuteman wings. However, no attempt was made to determine the impact of differences in performance within a wing from year to year on wing policy to include areas such as training, testing, and lead-time preparation for inspections. In addition, no research was conducted to determine if the unit staff's perception of performance differences is the same at all Minuteman wings. That is, if a wing's crew performance drops from an outstanding to an excellent or lower, how does the wing respond in terms of policy changes that impact on MCCMs and do all the Minuteman wings respond in a similar manner?

Recommendations for Future Research

Several ideas for future research were suggested by this study. As observed previously in the discussion on wing performance analysis, IG and 3901 SMES results are but two measures and, perhaps, not the best measures of unit performance. Possibly local standardization evaluation scores might represent a more accurate measure of unit performance and bear a stronger relationship to unit attitude. Use of local standardization scores would also provide a much larger data base permitting greater confidence in any conclusions reached. Any future study, then, should consider an alternative performance measure.

A second recommendation for any future research stemming from this study would be to use parametric statistical analysis. Specifically, multivariate techniques such as factor analysis and canonical correlation offer a more powerful means for investigating relationships between worker attitudes and organizational effectiveness than non-parametric analysis.

Future research in the area of MCCM attitudes would be enhanced by expanded additional survey questionnaires; that is, expanded in the area of job and career field attitude. A seeming inconsistency was noted in the responses to two of the fifteen questions examined as part of this research effort. An expanded questionnaire would allow inclusion of questions designed to test for consistency

in response. Further, additional attitude data points are needed to more fully explore any proposed relationship between attitude and performance.

A final thought for future research would be to examine the requirement for two distinct higher headquarters inspection teams. Notwithstanding the dissimilar results observed in this research, intuitively it would seem that since both teams basically evaluate the same areas of operations, similar results should be noted. It would be interesting to determine why the results are dissimilar.

Epilog

While this study found no conclusive statistical evidence of relationship between MCCM attitude and missile wing operations performance, the effort to study the causes and effect of MCCM job satisfaction, or lack thereof, must continue. The role of MCCMs in this nation's defense is too critical to permit us to ignore or forget them.

APPENDICES

APPENDIX A

SELECTED QUESTIONS FROM THE 1978 MCCM SURVEY
(ENGEL AND O'NEILL)

MISSILE COMBAT CREW MEMBER SURVEY

*indicates specific attitude questions to be analyzed.

() indicates total number of respondents selecting answer.

Part I

Please circle the appropriate response for each of the following questions.

1. What is your base of assignment?
 - a. Malstrom (40)
 - b. Ellsworth (53)
 - c. Minot (46)
 - d. Whiteman (34)
 - e. F. E. Warren (60)
 - f. Grand Forks (32)
2. To what type of crew are you assigned?
 - a. Line (192)
 - b. Instructor (46)
 - c. Standboard (27)
3. What is your crew position?
 - a. MCCC (139)
 - b. DMCCC (126)
4. How many months of missile combat ready experience do you have?
 - a. 0 - 6 months (26)
 - b. 7 - 12 months (50)
 - c. 13 - 18 months (27)
 - d. 19 - 24 months (35)
 - e. 25 - 30 months (36)
 - f. 31 - 36 months (37)
 - g. More than 36 months (54)

5. What is your grade?

- a. Second Lieutenant (73)
- b. First Lieutenant (104)
- c. Captain (68)
- d. Major (20)
- e. Lieutenant Colonel (0)

Part II

Please circle the response which is most representative of your opinion about each item.

- * 12. Are you supervised by your immediate supervisor in a manner which is satisfactory to you?
 - a. A definite yes (116)
 - b. A qualified yes (98)
 - c. Neutral (25)
 - d. A qualified no (17)
 - e. A definite no (9)
- * 13. Do you feel that you are given adequate individual responsibility in your job?
 - a. A definite yes (84)
 - b. A qualified yes (100)
 - c. Neutral (17)
 - d. A qualified no (38)
 - e. A definite no (26)
- * 14. Do you enjoy doing the actual work involved in accomplishing your job?
 - a. A definite yes (58)
 - b. A qualified yes (100)
 - c. Neutral (38)
 - d. A qualified no (38)
 - e. A definite no (31)

- * 15. Do you feel a sense of personal accomplishment when performing your job?
 - a. A definite yes (61)
 - b. A qualified yes (97)
 - c. Neutral (29)
 - d. A qualified no (40)
 - e. A definite no (38)
- * 16. Does your job provide you ample opportunity to develop personal friendships with other officers in your unit?
 - a. A definite yes (105)
 - b. A qualified yes (97)
 - c. Neutral (22)
 - d. A qualified no (24)
 - e. A definite no (17)
- * 17. Do you consider the physical working environment of the capsule (LCC) to be satisfactory?
 - a. A definite yes (12)
 - b. A qualified yes (76)
 - c. Neutral (35)
 - d. A qualified no (73)
 - e. A definite no (69)
- * 18. Do you like your job?
 - a. A definite yes (42)
 - b. A qualified yes (98)
 - c. Neutral (29)
 - d. A qualified no (54)
 - e. A definite no (42)

- * 19. Does your job have a favorable effect on your personal life?
 - a. A definite yes (11)
 - b. A qualified yes (56)
 - c. Neutral (62)
 - d. A qualified no (62)
 - e. A definite no (74)
- * 20. Are you satisfied with your work schedule?
 - a. A definite yes (16)
 - b. A qualified yes (84)
 - c. Neutral (47)
 - d. A qualified no (57)
 - e. A definite no (61)
- * 21. Does your job offer you a reasonable opportunity for individual recognition?
 - a. A definite yes (32)
 - b. A qualified yes (115)
 - c. Neutral (34)
 - d. A qualified no (54)
 - e. A definite no (30)
- * 22. Do you feel that missile crew duty is fully understood and appreciated by senior command and staff personnel in your unit?
 - a. Yes (106)
 - b. No (159)
- 23. Do you desire to remain in the missile career field?
 - a. Yes (71)
 - b. No (190)
 - Missing (4)

- * 24. Do you feel that missile crew duty is fully understood and appreciated by command and staff personnel at higher headquarters?
- a. Yes (31)
 - b. No (232)
 - Missing (2)
25. If your missile duty is a career broadening assignment, do you believe it enhances your career opportunities?
- a. A definite yes (15)
 - b. A qualified yes (40)
 - c. Neutral (9)
 - d. A qualified no (8)
 - e. A definite no (12)
 - f. N/A: was not career broadening assignment (181)
- * 26. Which of the following best describes your feelings about the missile operations career field?
- a. It's a dead end. (66)
 - b. It's a career field with some future. (150)
 - c. It's a career field with a very promising future. (48)
 - Missing (1)
- * 27. Do you think the opportunity for advancement in the missile operations career field is at least as good as other Air Force career fields?
- a. A definite yes (29)
 - b. A qualified yes (99)
 - c. Neutral (50)
 - d. A qualified no (60)
 - e. A definite no (27)

28. How do you feel about the current four year tour?
- a. It is too short. (4)
 - b. It is about right. (95)
 - c. It is too long. (166)
29. Given the opportunity to stay in the immediate area (or at another Minuteman base of your choice), and "do your own thing" during periods when you were not required to be on alert/in training, etc., would you be willing to remain a MCCM for 20 years?
- a. A definite yes (4)
 - b. A qualified yes (22)
 - c. Neutral (11)
 - d. A qualified no (27)
 - e. A definite no (201)
30. What would your response to the question above be if you know that promotion opportunity would not exceed the rank of major?
- a. A definite yes (3)
 - b. A qualified yes (14)
 - c. Neutral (9)
 - d. A qualified no (20)
 - e. A definite no (219)
- * 31. Do you feel that adequate efforts have been made to improve missile crew duty and to resolve problems generally encountered by missile crew members?
- a. A definite yes (8)
 - b. A qualified yes (67)
 - c. Neutral (30)
 - d. A qualified no (81)
 - e. A definite no (79)

32. When was the first official information on the Minuteman Education Program (MMEP) presented to you?
- a. AFROTC/ACADEMY/OTS/AECP (160)
 - b. Vandenberg (ORT/IQT) (35)
 - c. At your missile wing (43)
 - d. Other: Specify _____ (27)
33. The first official information I received about the MMEP was:
- a. Inadequate (35)
 - b. A brief overview of the MMEP (202)
 - c. A well organized presentation (23)
 - d. A comprehensive treatment of all aspects of the MMEP (5)

Part III

Please circle the response which is most representative of your opinion about each item.

34. Did your supervisors encourage you to participate in a graduate education program other than the Minuteman Education Program?
- a. A definite yes (15)
 - b. A qualified yes (47)
 - c. Neutral (80)
 - d. A qualified no (57)
 - e. A definite no (65)
 - Missing (1)

APPENDIX B

SAC IG AND 3901 SMES RATINGS, ASSIGNED POINTS,
AND PERFORMANCE INDICES

TABLE B-1
SAC IG RATINGS, ASSIGNED POINTS, AND PERFORMANCE INDEX VALUES

	Crew Performance	Crew EWO	Stan/ Eval	Training	Performance Index
<u>Ellsworth</u>					
1974	E 30	E 30	S 13.4	S 13.4	86.8
1975	S 20	0 30	S 13.4	S 13.4	76.8
1976	0 30	0 30	0 20	S 10	90.0
1977	E 22.5	0 30	E 15	S 10	77.5
1978	E 22.5	0 30	E 15	E 15	82.5
<u>FE Warren</u>					
1974	E 30	S 20	S 13.4	S 13.4	76.8
1975	0 30	S 20	S 13.4	S 13.4	76.8
1976	0 30	0 30	S 10	S 10	80.0
1977	0 30	E 22.5	E 15	S 10	77.5
1978	S 15	0 30	S 10	S 10	65.0
<u>Minot</u>					
1974	E 30	U 0	S 13.4	S 13.4	56.8
1975	0 30	0 30	S 13.4	0 20	93.4
1976	E 22.5	E 22.5	E 15	S 10	70.0
1977	0 30	0 30	E 15	S 10	85.0
1978	0 30	0 30	S 10	S 10	80.0
<u>Grand Forks</u>					
1974	E 30	E 30	S 13.4	S 13.4	86.8
1975	S 20	U 0	S 13.4	M 6.7	40.0
1976	0 30	0 30	S 10	S 10	80.0
1977	0 30	0 30	E 15	E 15	90.0
1978	S 15	E 22.5	E 15	E 15	67.5

TABLE B-1--Continued

	Crew Performance	Crew EWO	Stan/ Eval	Training	Performance Index
<u>Malmstrom</u>					
1974	S 20	U 0	S 13.4	S 13.4	46.8
1975	0 30	S 20	S 13.4	S 13.4	76.8
1976	0 30	0 30	E 15	E 15	90.0
1977	E 22.5	0 30	S 10	E 15	77.5
1978	0 30	0 30	S 10	E 15	85.0
<u>Whiteman</u>					
1974	E 20	E 30	S 13.4	S 13.4	86.8
1975	-	-	-	-	-
1976	0 30	0 30	S 10	S 10	80.0
1977	S 15	0 30	E 15	S 10	70.0
1978	0 30	0 30	E 15	S 10	85.0

TABLE B-2
3901 SMES RATINGS, ASSIGNED POINTS, AND PERFORMANCE INDEX VALUES

	Personnel Proficiency										Performance Index		
	Highly Qualified					Unqualified							
	#	Pts	#	Pts	#	Pts	#	Pts	Stan/ Eval	Training			
Ellsworth													
1974	16	32	4	4	0	0	0	0	E	30	S	20	83.0
1974	13	26	4	4	3	0	0	0	E	30	S	20	-
1975	14	28	5	5	1	0	0	0	S	20	S	20	73.0
1976	14	28	6	6	0	0	0	0	S	20	E	30	84.0
1977	16	32	4	4	0	0	0	0	S	15	0	30	82.8
1977	14	28	4	4	2	0	0	0	0	30	E	22.5	-
1978	15	30	2	2	3	0	0	0	E	22.5	E	22.5	77.0
FE Warren													
1974	12	24	8	8	0	0	0	0	S	20	E	30	78.5
1974	15	30	5	5	0	0	0	0	S	20	S	20	-
1975	17	34	3	3	0	0	0	0	S	20	S	20	74.0
1976	11	22	6	6	3	0	0	0	S	15	E	22.5	65.5
1977	8	16	8	8	4	0	0	0	S	15	E	22.5	61.5
1978	16	32	2	2	2	0	0	0	0	30	0	30	77.5
1978	14	28	3	3	3	0	0	0	S	15	S	15	0
Minot													
1974	15	30	4	4	1	0	0	0	E	30	E	30	89.0
1974	15	30	4	4	1	0	0	0	S	20	E	30	-
1975	12	24	6	6	2	0	0	0	E	30	E	30	89.0
1975	18	36	2	2	0	0	0	0	E	30	S	20	-
1976	10	20	8	8	2	0	0	0	S	15	S	15	58.0
1977	13	26	7	7	0	0	0	0	S	15	E	22.5	70.5
1978	16	32	4	4	0	0	0	0	S	15	S	15	66.0

TABLE B-2--Continued

Personnel Proficiency										
	Highly Qualified			Qualified		Unqualified		Stan/ Eval	Training	Performance Index
	#	Pts	#	#	Pts	#	Pts			
Grand Forks										
1974	13	26	5	5	2	0	S	S	20	82.5
1974	16	32	2	2	2	0	E	E	30	-
1975	12	24	7	7	1	0	S	S	20	77.0
1975	13	26	7	7	0	0	E	S	20	-
1976	10	20	7	7	3	0	S	S	15	57.0
1977	9	18	6	6	5	0	E	S	15	61.5
1978	19	38	1	1	0	0	0	E	22.5	91.5
Malmstrom										
1974*	22	44	4	4	2	0	E	E	30	83.5
1974*	20	40	6	6	2	0	S	S	20	-
1975*	18	36	10	10	0	0	E	S	20	83.0
1976*	18	36	6	6	4	0	S	S	15	60.0
1977	17	34	2	2	1	0	S	S	15	60.5
1977*	17	34	8	8	3	0	S	S	15	-
1978*	18	36	9	9	1	0	E	S	15	69.5
Whiteman										
1974	17	34	3	3	0	0	S	S	20	86.5
1974	16	32	4	4	0	0	E	E	30	-
1975	16	32	0	0	4	0	S	E	30	82.0
1976	13	26	5	5	2	0	S	S	15	61.0
1977	14	28	5	5	1	0	S	0	30	78.0
1978	16	32	4	4	0	0	0	0	30	85.5
1978	10	20	10	10	0	0	S	0	30	-

*Correction factor applied in years where 28 MCCMs were evaluated.

APPENDIX C

KRUSKAL-WALLIS SIGNIFICANCE LEVEL COMPARISONS WITH
F. E. WARREN AND/OR ELLSWORTH
REMOVED FROM THE INPUT DATA

TABLE C-1
KRUSKAL-WALLIS SIGNIFICANCE LEVEL COMPARISONS

Hypothesis	Attitude Variable	All Wings	-FE Warren	-Ellsworth	-FE Warren + Ellsworth
1	General job attitude	<.0001*	.1261	<.0001*	.3146
2	Satisfaction with supervision	.4112	.2940	.5693	.4025
3	Sense of accomplishment	<.0001*	.9362	.0001*	.9790
4	Opportunity for recognition	.0001*	.0416*	.0291*	.9307
5	Attitude toward work	<.0001*	.4068	.0001*	.6785
6	Individual responsibility	.0010*	.7635	.0041*	.7854
7	Work schedule	<.0001*	.0001*	.0022*	.1636
8	Personal friendships	.0253*	.0899	.0589	.1117
9	Physical working environment	<.0001*	.0000*	.0039*	.0049*
10	Effect on personal life	<.0001*	.0007*	.0032*	.0282*
11	Opportunity for advancement	.0421*	.3059	.0387*	.2200
12	Career field	.0009*	.1415	.0006*	.1524
13	Efforts to improve duty	.0001*	.0061*	.0036*	.0406*
14	Higher HQ understanding	.0014*	.0141*	.0986	.2120
15	Unit staff understanding	<.0001*	.0011*	.0001*	.0083*

*Statistically significant.

APPENDIX D

MANN-WHITNEY TEST RESULTS WITH 1976 AND 1978
QUESTIONNAIRE RESPONSE DISTRIBUTIONS BY BASE

TABLE D-1
MANN-WHITNEY TEST RESULTS FOR ELLSWORTH

Attitude Variable	1976 Mean	1978 Mean	Computed Z	Prob. p	Significant
General job attitude	5.8	5.2	-.3172	.7511	No
Satisfaction with supervision	5.5	5.5	.0000	1.0000	No
Sense of accomplishment	5.6	5.4	-.1048	.9166	No
Opportunity for recognition	6.3	4.7	-.8485	.3961	No
Attitude toward work	5.2	5.8	.3143	.7533	No
Individual responsibility	6.0	5.0	-.5254	.5993	No
Work schedule	5.6	5.4	-.1054	.9161	No
Personal friendships	5.9	5.1	-.4203	.6742	No
Physical working environment	5.3	5.7	.2095	.8340	No
Effect on personal life	5.2	5.8	.3172	.7511	No
Opportunity for advancement	5.6	5.4	-.1044	.9168	No
Career field	3.3	3.7	.2182	.8273	No
Efforts to improve duty	5.0	6.0	.5222	.6015	No
Higher HQ understanding	2.3	2.8	.4082	.6831	No
Unit staff understanding	2.0	3.0	.7746	.4386	No

TABLE D-2
QUESTIONNAIRE RESPONSE DISTRIBUTION FOR ELLSWORTH

Question Number	Year	Definite Yes	Qualified Yes	Neutral	Qualified No	Definite No	Missing	Total
12	1978	25	23	5	0	0	0	53
	1976	19	15	5	4	3	1	47
13	1978	18	28	2	3	2	0	53
	1976	6	15	7	13	6	0	47
14	1978	18	20	9	4	2	0	53
	1976	12	16	3	8	8	0	47
15	1978	16	21	8	6	2	0	53
	1976	5	17	7	9	9	0	47
16	1978	23	25	3	1	1	0	53
	1976	23	11	6	5	2	0	47
17	1978	5	21	12	13	2	0	53
	1976	2	22	9	8	6	0	47
18	1978	12	26	8	4	3	0	53
	1976	8	15	9	7	8	0	47
19	1978	3	17	17	14	2	0	53
	1976	0	9	15	17	6	0	47

TABLE D-2--Continued

Question Number	Year	Definite Yes	Qualified Yes	Neutral	Qualified No	Definite No	Yes	No	Dead End	Some Future	Promising Future	Missing	Total
20	1978	7	27	14	2	3	-	-	-	-	-	0	53
	1976	4	29	3	7	4	-	-	-	-	-	0	47
21	1978	9	35	3	4	2	-	-	-	-	-	0	53
	1976	4	17	9	13	4	-	-	-	-	-	0	47
22	1978	-	-	-	-	-	33	20	-	-	-	0	53
	1976	8	8	7	20	3	-	-	-	-	-	1	47
24	1978	-	-	-	-	-	14	38	-	-	-	1	53
	1976	1	3	7	23	12	-	-	-	-	-	1	47
26	1978	-	-	-	-	-	-	-	11	34	7	1	53
	1976	-	-	-	-	-	-	-	15	29	3	0	47
27	1978	4	23	13	12	1	-	-	-	-	-	0	53
	1976	3	8	6	15	14	-	-	-	-	-	1	47
31	1978	1	20	10	16	6	-	-	-	-	-	0	53
	1976	0	15	5	17	9	-	-	-	-	-	1	47

TABLE D-3
MANN-WHITNEY TEST RESULTS FOR F. E. WARREN

Attitude Variable	1976 Mean	1978 Mean	Computed Z	Prob. p	Significant
General job attitude	4.4	6.6	1.1559	.2477	No
Satisfaction with supervision	4.9	6.1	.6286	.5296	No
Sense of accomplishment	4.8	6.2	.7311	.4647	No
Opportunity for recognition	4.3	6.7	1.2572	.2087	No
Attitude toward work	3.9	7.1	1.6814	.0927	No
Individual responsibility	4.1	6.9	1.4667	.1425	No
Work schedule	4.5	6.5	1.0476	.2948	No
Personal friendships	3.9	7.1	1.6865	.0917	No
Physical working environment	4.6	6.4	.9429	.3457	No
Effect on personal life	4.9	6.1	.6286	.5296	No
Opportunity for advancement	3.4	7.6	2.2274	.0259	Yes
Career field	3.0	4.0	.6547	.5127	No
Efforts to improve duty	5.2	5.8	.3153	.7526	No
Higher HQ understanding	2.5	2.5	.0000	1.0000	No
Unit staff understanding	2.5	2.5	.0000	1.0000	No

TABLE D-4
QUESTIONNAIRE RESPONSE DISTRIBUTION FOR F. E. WARREN

Question Number	Year	Definite Yes	Qualified Yes	Neutral	Qualified No	Definite No	Missing	Total
12	1978	26	21	2	8	3	0	60
	1976	11	13	6	3	1	0	34
13	1978	9	20	5	15	11	0	60
	1976	7	13	2	3	9	0	34
14	1978	3	17	12	12	16	0	60
	1976	3	10	6	7	8	0	34
15	1978	3	17	5	16	19	0	60
	1976	4	7	6	8	9	0	34
16	1978	21	15	6	9	9	0	60
	1976	8	15	3	4	4	0	34
17	1978	1	13	6	17	23	0	60
	1976	3	12	7	7	5	0	34
18	1978	1	12	7	20	20	0	60
	1976	2	9	6	6	11	0	34
19	1978	0	7	9	20	24	0	60
	1976	1	8	5	9	11	0	34

TABLE D-4--Continued

Question Number	Year	Definite Yes	Qualified Yes	Neutral	Qualified No	Definite No	Yes	No	Dead End	Some Future	Promising Future	Missing	Total
20	1978	1	9	8	18	24	-	-	-	-	-	0	60
	1976	2	11	6	8	7	-	-	-	-	-	0	34
21	1978	2	19	8	18	13	-	-	-	-	-	0	60
	1976	1	13	3	12	5	-	-	-	-	-	0	34
22	1978	-	-	-	-	-	10	50	-	-	-	0	60
	1976	4	11	3	9	7	-	-	-	-	-	0	34
24	1978	-	-	-	-	-	2	57	-	-	-	1	60
	1976	1	7	7	9	10	-	-	-	-	-	0	34
26	1978	-	-	-	-	-	-	-	23	35	2	0	60
	1976	-	-	-	-	-	-	-	8	20	6	0	34
27	1978	7	13	14	12	14	-	-	-	-	-	0	60
	1976	5	10	9	5	5	-	-	-	-	-	0	34
31	1978	0	8	5	21	26	-	-	-	-	-	0	60
	1976	1	11	9	5	8	-	-	-	-	-	0	34

TABLE D-5
MANN-WHITNEY TEST RESULTS FOR MINOT

Attitude Variable	1976 Mean	1978 Mean	Computed Z	Prob. p	Significant
General job attitude	4.9	6.1	.6325	.5271	No
Satisfaction with supervision	4.7	6.3	.8381	.4020	No
Sense of accomplishment	5.6	5.4	-.1051	.9163	No
Opportunity for recognition	4.8	6.2	.7356	.4620	No
Attitude toward work	5.5	5.5	.0000	1.0000	No
Individual responsibility	5.4	5.6	.1048	.9166	No
Work schedule	4.8	6.2	.7402	.4592	No
Personal friendships	4.8	6.2	.7356	.4620	No
Physical working environment	5.1	5.9	.4191	.6752	No
Effect on personal life	5.0	6.0	.5320	.5947	No
Opportunity for advancement	5.4	5.6	.1048	.9166	No
Career field	3.0	4.0	.6547	.5127	No
Efforts to improve duty	5.0	6.0	.5303	.5959	No
Higher HQ understanding	2.5	2.5	.0000	1.0000	No
Unit staff understanding	2.5	2.5	.0000	1.0000	No

TABLE D-6
QUESTIONNAIRE RESPONSE DISTRIBUTION FOR MINOT

Question Number	Year	Definite Yes	Qualified Yes	Neutral	Qualified No	Definite No	Missing	Total
12	1978	22	13	6	3	2	0	46
	1976	19	14	1	2	0	2	38
13	1978	21	13	1	6	5	0	46
	1976	15	8	4	4	7	0	38
14	1978	14	17	4	4	7	0	46
	1976	5	12	6	8	7	0	38
15	1978	13	20	3	3	7	0	46
	1976	5	11	4	14	4	0	38
16	1978	23	14	2	4	3	0	46
	1976	12	20	3	1	2	0	38
17	1978	2	16	6	14	8	0	46
	1976	3	14	4	7	10	0	38
18	1978	12	17	3	7	7	0	46
	1976	6	11	4	12	4	1	38
19	1978	6	12	10	7	11	0	46
	1976	1	7	7	10	12	1	38

TABLE D-6--Continued

Question Number	Year	Definite Yes	Qualified Yes	Neutral	Qualified No	Definite No	Yes	No	Dead End	Some Future	Promising Future	Missing	Total
20	1978	4	14	5	12	11	-	-	-	-	-	0	46
	1976	4	13	8	9	4	-	-	-	-	-	0	38
21	1978	7	19	6	10	4	-	-	-	-	-	0	46
	1976	8	19	3	6	2	-	-	-	-	-	0	38
22	1978	-	-	-	-	-	13	33	-	-	-	0	46
	1976	9	11	3	10	4	-	-	-	-	-	1	38
24	1978	-	-	-	-	-	4	42	-	-	-	0	46
	1976	3	2	3	17	12	-	-	-	-	-	1	38
26	1978	-	-	-	-	-	-	-	11	17	18	0	46
	1976	-	-	-	-	-	-	-	5	23	10	0	38
27	1978	5	19	5	12	4	-	-	-	-	-	0	46
	1976	11	10	7	7	3	-	-	-	-	-	0	38
31	1978	3	13	5	13	12	-	-	-	-	-	0	46
	1976	2	13	6	11	6	-	-	-	-	-	0	38

TABLE D-7
MANN-WHITNEY TEST RESULTS FOR GRAND FORKS

Attitude Variable	1976 Mean	1978 Mean	Computed Z	Prob. p	Significant
General job attitude	5.7	5.3	-.2102	.8335	No
Satisfaction with supervision	6.0	5.0	-.5305	.5959	No
Sense of accomplishment	5.8	5.2	-.3172	.7511	No
Opportunity for recognition	5.6	5.4	-.1048	.9166	No
Attitude toward work	6.0	5.0	-.5303	.5959	No
Individual responsibility	5.7	5.3	-.2121	.8320	No
Work schedule	5.2	5.8	.3182	.7503	No
Personal friendships	5.5	5.5	.0000	1.0000	No
Physical working environment	6.1	4.9	-.6305	.5284	No
Effect on personal life	5.6	5.4	-.1054	.9161	No
Opportunity for advancement	5.0	6.0	.5303	.5959	No
Career field	3.0	4.0	.6547	.5127	No
Efforts to improve duty	5.5	5.5	.0000	1.0000	No
Higher HQ understanding	2.5	2.5	.0000	1.0000	No
Unit staff understanding	2.5	2.5	.0000	1.0000	No

TABLE D-8
QUESTIONNAIRE RESPONSE DISTRIBUTION FOR GRAND FORKS

Question Number	Year	Definite Yes	Qualified Yes	Neutral	Qualified No	Definite No	Missing	Total
12	1978	17	10	3	1	1	0	32
	1976	18	6	2	3	3	0	32
13	1978	12	8	1	7	4	0	32
	1976	8	7	0	8	9	0	32
14	1978	4	16	4	8	0	0	32
	1976	6	7	5	7	7	0	32
15	1978	7	16	1	5	3	0	32
	1976	3	11	3	6	8	1	32
16	1978	9	14	6	2	1	0	32
	1976	9	17	1	3	1	0	32
17	1978	0	5	2	8	17	0	32
	1976	3	6	8	6	9	0	32
18	1978	4	10	3	10	5	0	32
	1976	1	13	5	6	7	0	32
19	1978	1	4	5	11	11	0	32
	1976	2	6	6	9	9	0	32

TABLE D-8--Continued

Question Number	Year	Definite Yes	Qualified Yes	Neutral	Qualified No	Definite No	Yes	No	Dead End	Some Future	Promising Future	Missing	Total
20	1978	3	8	5	8	8	-	-	-	-	-	0	32
	1976	4	11	4	6	7	-	-	-	-	-	0	32
21	1978	6	11	3	9	3	-	-	-	-	-	0	32
	1976	4	12	1	10	5	-	-	-	-	-	0	32
22	1978	-	-	-	-	-	14	18	-	-	-	0	32
	1976	1	6	6	14	5	-	-	-	-	-	0	32
24	1978	-	-	-	-	-	3	29	-	-	-	0	32
	1976	0	3	5	12	12	-	-	-	-	-	0	32
26	1978	-	-	-	-	-	-	-	6	16	10	0	32
	1976	-	-	-	-	-	-	-	4	25	3	0	32
27	1978	5	10	7	7	3	-	-	-	-	-	0	32
	1976	5	14	2	6	5	-	-	-	-	-	0	32
31	1978	1	4	1	11	15	-	-	-	-	-	0	32
	1976	0	7	4	13	8	-	-	-	-	-	0	32

TABLE D-9
MANN-WHITNEY TEST RESULTS FOR MALMSTROM

Attitude Variable	1976 Mean	1978 Mean	Computed Z	Prob. p	Significant
General job attitude	5.4	5.6	.1048	.9166	No
Satisfaction with supervision	5.2	5.8	.3133	.7540	No
Sense of accomplishment	5.2	5.8	.3212	.7480	No
Opportunity for recognition	5.4	5.6	.1051	.9163	No
Attitude toward work	5.0	6.0	.5254	.5993	No
Individual responsibility	5.7	5.3	-.2095	.8340	No
Work schedule	5.2	5.8	.3133	.7540	No
Personal friendships	5.5	5.5	.0000	1.0000	No
Physical working environment	4.9	6.1	.6325	.5271	No
Effect on personal life	4.7	6.3	.8485	.3961	No
Opportunity for advancement	6.0	5.0	-.5388	.5900	No
Career field	3.5	3.5	.0000	1.0000	No
Efforts to improve duty	5.0	6.0	.5238	.6004	No
Higher HQ understanding	2.5	2.5	.0000	1.0000	No
Unit staff understanding	2.3	2.8	.4082	.6831	No

TABLE D-10
QUESTIONNAIRE RESPONSE DISTRIBUTION FOR MALMSTROM

Question Number	Year	Definite Yes	Qualified Yes	Neutral	Qualified No	Definite No	Missing	Total
12	1978	16	13	8	2	1	0	40
	1976	15	6	4	9	0	0	34
13	1978	13	16	6	2	3	0	40
	1976	4	8	6	9	7	0	34
14	1978	9	16	6	5	4	0	40
	1976	3	14	4	7	6	0	34
15	1978	12	13	7	4	4	0	40
	1976	4	11	5	7	7	0	34
16	1978	19	15	3	2	1	0	40
	1976	12	13	4	4	1	0	34
17	1978	3	12	5	11	9	0	40
	1976	1	8	5	11	9	0	34
18	1978	7	17	5	9	2	0	40
	1976	3	11	6	6	8	0	34
19	1978	1	10	12	7	10	0	40
	1976	1	10	6	9	8	0	34

TABLE D-10--Continued

Question Number	Year	Definite Yes	Qualified Yes	Neutral	Qualified No	Definite No	Yes	No	Dead End	Some Future	Promising Future	Missing	Total
20	1978	1	16	11	8	4	-	-	-	-	-	0	40
	1976	6	9	2	14	3	-	-	-	-	-	0	34
21	1978	4	18	8	7	3	-	-	-	-	-	0	40
	1976	6	7	4	12	5	-	-	-	-	-	0	34
22	1978	-	-	-	-	-	25	15	-	-	-	0	40
	1976	3	9	6	8	7	-	-	-	-	-	1	34
24	1978	-	-	-	-	-	7	33	-	-	-	0	40
	1976	0	6	5	13	9	-	-	-	-	-	1	34
26	1978	-	-	-	-	-	-	-	5	28	7	0	40
	1976	-	-	-	-	-	-	-	10	19	5	0	34
27	1978	5	21	7	5	2	-	-	-	-	-	0	40
	1976	6	10	5	5	8	-	-	-	-	-	0	34
31	1978	1	13	8	9	9	-	-	-	-	-	0	40
	1976	0	11	6	10	7	-	-	-	-	-	0	34

TABLE D-11

MANN-WHITNEY TEST RESULTS FOR WHITEMAN

Attitude Variable	1976 Mean	1978 Mean	Computed z	Prob. p	Significant
General job attitude	6.6	4.4	-1.1559	.2477	No
Satisfaction with supervision	6.2	4.8	-.7356	.4620	No
Sense of accomplishment	5.6	5.4	-.1051	.9163	No
Opportunity for recognition	5.6	5.4	-.1051	.9163	No
Attitude toward work	6.1	4.9	-.6325	.5271	No
Individual responsibility	6.1	4.9	-.6364	.5245	No
Work schedule	6.0	5.0	-.5238	.6004	No
Personal friendships	5.9	5.1	-.4203	.6742	No
Physical working environment	6.5	4.5	-1.0509	.2933	No
Effect on personal life	6.2	4.8	-.7356	.4620	No
Opportunity for advancement	6.3	4.7	-.8381	.4020	No
Career field	3.7	3.3	-.2214	.8248	No
Efforts to improve duty	6.0	5.0	-.5303	.5959	No
Higher HQ understanding	3.0	2.0	-.7746	.4386	No
Unit staff understanding	3.0	2.0	-.7746	.4386	No

TABLE D-12
QUESTIONNAIRE RESPONSE DISTRIBUTION FOR WHITEMAN

Question Number	Year	Definite Yes	Qualified Yes	Neutral	Qualified No	Definite No	Missing	Total
12	1978	10	18	1	3	2	0	34
	1976	19	15	6	2	3	0	45
13	1978	11	15	2	5	1	0	34
	1976	19	16	1	5	4	0	45
14	1978	10	14	3	5	2	0	34
	1976	10	17	5	3	9	1	45
15	1978	10	10	5	6	3	0	34
	1976	8	20	4	4	9	0	45
16	1978	10	14	2	6	2	0	34
	1976	18	17	6	3	1	0	45
17	1978	1	9	4	10	10	0	34
	1976	2	15	4	13	11	0	45
18	1978	6	16	3	4	5	0	34
	1976	7	20	6	4	8	0	45
19	1978	0	6	9	3	16	0	34
	1976	3	8	11	17	6	0	45

TABLE D-12--Continued

Question Number	Year	Definite Yes	Qualified Yes	Neutral	Qualified No	Definite No	Yes	No	Dead End	Some Future	Promising Future	Missing	Total
20	1978	0	10	4	9	11	-	-	-	-	-	0	34
	1976	3	16	6	14	6	-	-	-	-	-	0	45
21	1978	4	13	6	6	5	-	-	-	-	-	0	34
	1976	7	23	3	9	3	-	-	-	-	-	0	45
22	1978	-	-	-	-	-	11	23	-	-	-	0	34
	1976	6	18	2	15	3	-	-	-	-	-	1	45
24	1978	-	-	-	-	-	1	33	-	-	-	0	34
	1976	0	5	3	29	8	-	-	-	-	-	0	45
26	1978	-	-	-	-	-	-	-	10	20	4	0	34
	1976	-	-	-	-	-	-	-	9	32	3	1	45
27	1978	2	13	4	12	3	-	-	-	-	-	0	34
	1976	4	20	7	8	6	-	-	-	-	-	0	45
31	1978	2	9	1	11	11	-	-	-	-	-	0	34
	1976	2	15	2	19	7	-	-	-	-	-	0	45

APPENDIX E

1976 AND 1978 SURVEY QUESTION RESPONSE
DISTRIBUTION FOR ALL MCCMs

TABLE E-1
1976 AND 1978 QUESTIONNAIRE RESPONSE DISTRIBUTION FOR ALL MCCMS

Question Number	Year	Definite Yes	Qualified Yes	Neutral	Qualified No	Definite No	Missing	Total
12	1978	116	98	25	17	9	0	265
	1976	101	69	24	23	10	3	230
13	1978	84	100	17	38	26	0	265
	1976	59	67	20	42	42	0	230
14	1978	58	100	38	38	31	0	265
	1976	39	76	29	40	45	1	230
15	1978	61	97	29	40	38	0	265
	1976	29	77	29	48	46	1	230
16	1978	105	97	22	24	17	0	265
	1976	82	93	24	20	11	0	230
17	1978	12	76	35	73	69	0	265
	1976	14	77	37	52	50	0	230
18	1978	42	98	29	54	42	0	265
	1976	27	79	36	41	46	1	230
19	1978	11	56	62	62	74	0	265
	1976	8	48	50	71	52	1	230

TABLE E-1--Continued

Question Number	Year	Definite Yes	Qualified Yes	Neutral	Qualified No	Definite No	Yes	No	Dead End	Some Future	Promising Future	Missing	Total
20	1978	16	84	47	57	61	-	-	-	-	-	0	265
	1976	23	89	29	58	31	-	-	-	-	-	0	230
21	1978	32	115	34	54	30	-	-	-	-	-	0	265
	1976	30	91	23	62	24	-	-	-	-	-	0	230
22	1978	-	-	-	-	-	106	159	-	-	-	0	265
	1976	31	63	27	76	29	-	-	-	-	-	4	230
24	1978	-	-	-	-	-	31	232	-	-	-	2	265
	1976	5	26	30	103	63	-	-	-	-	-	3	230
26	1978	-	-	-	-	-	-	-	66	150	48	1	265
	1976	-	-	-	-	-	-	-	51	148	30	1	230
27	1978	29	99	50	60	27	-	-	-	-	-	0	265
	1976	34	72	36	46	41	-	-	-	-	-	1	230
31	1978	8	67	30	81	79	-	-	-	-	-	0	265
	1976	5	72	32	75	45	-	-	-	-	-	1	230

APPENDIX F

INPUT ATTITUDE AND PERFORMANCE RANKINGS USED
FOR THE SPEARMAN RANK CORRELATION TEST

TABLE F-1
INPUT RANKINGS FOR SPEARMAN RANK CORRELATION TEST

BASE	ATTITUDE	PERFORMANCE - IG				
	1978	1974	1975	1976	1977	1978
Ellsworth	1.0	2.0	3.5	1.5	4.0	3.0
F E Warren	6.0	4.0	3.5	4.0	4.0	6.0
Minot	2.5	4.0	1.0	6.0	2.0	4.0
Grand Forks	4.5	2.0	6.0	4.0	1.0	5.0
Malmstrom	2.5	6.0	3.5	1.5	4.0	1.5
Whiteman	4.5	2.0	3.5	4.0	6.0	1.5

BASE	ATTITUDE	PERFORMANCE - 3901 SMES				
	1978	1974	1975	1976	1977	1978
Ellsworth	1.0	4.0	5.5	1.0	1.0	3.5
F E Warren	6.0	6.0	5.5	2.0	5.0	3.5
Minot	2.5	1.0	1.0	5.5	3.0	6.0
Grand Forks	4.5	4.0	4.0	5.5	5.0	1.0
Malmstrom	2.5	4.0	2.5	3.5	5.0	5.0
Whiteman	4.5	2.0	2.5	3.5	2.0	2.0

SELECTED BIBLIOGRAPHY

A. REFERENCES CITED

1. Ashbaugh, Captain Dennis M., USAF, and Captain Larry J. Godfrey, USAF. "The Impact of the SAC Missile Management Working Group on Missile Combat Crew Members Attitudes." Unpublished master's thesis, SLSR 14-76B, AFIT/LS, Wright-Patterson AFB OH, 1976. AD 032537.
2. Bickerstaff, Rodgers W. "A Review of Literature on Missile Combat Crew Attitudes and Motivation." Unpublished study, University of North Dakota, Minot AFB ND, 1973.
3. Bowe, Colonel Donnovan K., USAF. "Retention of Junior Officers in the Minuteman Crew Force." Unpublished research report No. 3722, Air War College, Air University, Maxwell AFB AL, 1969. LD 19840.
4. Brayfield, Arthur H., and Walter H. Crockett. "Employee Attitudes and Employee Performance," Psychological Bulletin 52 (1955), pp. 396-425.
5. Brooksher, Colonel William R., USAF, and Colonel Jimmy F. Scott, USAF. "A Study of the Intercontinental Ballistic Missile Operations Career Field." Unpublished research paper, unnumbered, The National War College, Washington DC, 1973.
6. Cancellieri, Captain Robert, USAF, and Major David J. Willoughby, USAF. "A Study of the Relationships Between Demographic Factors and SAC Missile Combat Crew Members' Attitudes." Unpublished master's thesis, LSSR 34-77B, AFIT/LS, Wright-Patterson AFB OH, 1977. AD A047138.
7. Chein, Isidor. "Behavior Theory and the Behavior of Attitudes: Some Critical Comments." In Readings in Attitude Theory and Measurement, pp. 51-57. Edited by Martin Fishbein. New York: John Wiley and Sons, 1967.
8. Doob, Leonard W. "The Behavior of Attitudes." In Readings in Attitude Theory and Measurement, pp. 42-50. Edited by Martin Fishbein. New York: John Wiley and Sons, 1967.

9. Engel, Major John E., USAF. "A Study of the Relationship Between Worker Attitudes and Organizational Effectiveness in an Air Logistics Center Maintenance Directorate." Unpublished technical report, SLTR 3-77, AFIT/SL, Wright-Patterson AFB OH, August 1977.
10. Engel, Captain, Michael R., USAF, and Captain Patrick H. O'Neill, USAF. "The Impact of the Minuteman Education Program on Acquisition and Retention of missile Launch Control Officers." Unpublished master's thesis, SLSR 28-78B, AFIT/SL, Wright-Patterson AFB OH, August 1978.
11. Georgopoulos, Basil S., and Arnold S. Tannenbaum, "A Study of Organizational Effectiveness," American Sociological Review 22 (October 1957), pp. 534-40.
12. Gibbons, Jean D. Nonparametric Methods for Quantitative Analysis. New York: Holt, Rinehart, and Winston, 1976.
13. Herzberg, Frederick. "One More Time: How Do You Motivate Employees?" Harvard Business Review (January-February, 1968), pp. 51-62.
14. Kast, Fremont E., and James E. Rosenzweig. Organization and Management: A Systems Approach. New York: McGraw-Hill, Inc., 1974.
15. Lawler, Edward E., III, and Lyman W. Porter. "The Effect of Performance on Job Satisfaction," Industrial Relations 7 (October 1967), pp. 20-28.
16. _____. "What Job Attitudes Tell About Motivation," Harvard Business Review 46 (January-February 1968), pp. 53-62.
17. Mahoney, Thomas A., and William Weitzel. "Managerial Models of Organizational Effectiveness," Administrative Science Quarterly, 14 (September 1969), pp. 537-65.
18. March, James G., and Herbert A. Simon. Organizations. New York: John Wiley and Sons, 1958.
19. Maslow, A. H. Motivation and Personality. New York: Harper and Row Publishers, 1954.
20. McGregor, Douglas. The Human Side of Enterprise. New York: McGraw-Hill Book Company, Inc., 1960.

21. Morse, John J., and Jay W. Lorsch. "Beyond Theory Y." In Harvard Business Review on Management, pp. 377-89. New York: Harper and Row, Publishers, 1975.
22. Nie, Norman H., and others. Statistical Package for the Social Sciences. 2d ed. New York: McGraw-Hill Book Company, 1975.
23. Organ, Dennis W. "A Reappraisal and Reinterpretation of the Satisfaction-Cause-Performance Hypothesis," The Academy of Management Review, Vol. 2, No. 1 (January 1977), pp. 46-53.
24. Peak, Helen. "Attitude and Motivation." In Readings in Organizational Behavior and Human Performance, pp. 66-70. Edited by W. E. Scott, and L. L. Cummings. Homewood IL: Richard D. Irwin, 1973.
25. Perrow, Charles. Complex Organizations: A Critical Essay. Glenview IL: Scott, Foresman and Company, 1972.
26. Pigors, Paul, and Charles A. Myers. Personnel Administration: A Point of View and a Method. New York: McGraw-Hill Book Company, Inc., 1977.
27. Power, General Thomas S., USAF. "CINCSAC's comments: the Ultimate Weapon," Combat Crew, No. 7, January 1964, p. 5, in Bowe, Colonel Donnovan K., USAF. "Retention of Junior Officers in the Minuteman Crew Force." Unpublished research report No. 3722, Air War College, Air University, Maxwell AFB AL, 1969. LD 19840.
28. Pruitt, Lieutenant Colonel James L. Chief of Weapon System Evaluation, Standardization Evaluation Division, 3901 Strategic Missile Evaluation Squadron, Vandenberg AFB CA. Telephone interview. 7 March 1979.
29. Rodwell, Robert R. "Morale in a Missile Force," Aeronautics (March 1958), pp. 64-69.
30. Schwab, Donald P., and Larry L. Cummings. "Theories of Performance and Satisfaction: A Review." In Readings in Organizational Behavior and Human Performance, pp. 130-141. Edited by W. E. Scott, and L. L. Cummings. Homewood IL: Richard D. Irwin, 1973.

31. Siegel, Sydney. Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill Book Company, Inc., 1956.
32. Strategic Air Command Inspector General Operating Instruction 20-1, Offutt AFB NE, 1 September 1978.
33. Tuccy, J. SPSS Subprogram NPAR TESTS: Nonparametric Statistical Tests. Vogelback Computing Center Manual No. 324 (Rev C). Evanston IL: Northwestern University, 1977.
34. Twardzik, Lieutenant Colonel Robert P. ICBM Operations Inspector, Inspector General, HQ SAC. Telephone interview. 1 February 1979.

B. RELATED SOURCES

- Gilkeson, Major Thomas A., USAF. "Missile Crewmember--His Needs and Satisfaction." Unpublished research paper No. 1040-72, Air Command and Staff College, Air University, Maxwell AFB AL, 1972.
- Hamada, Lieutenant Colonel Richard K. Chief, Support Branch, 3901 Strategic Missile Evaluation Squadron. Letter, subject: 3901st SMES Inspection Results, to AFIT/LSGR, 2 March 1979.
- Heske, Major William J., USAF. "Management of the Intercontinental Ballistic Missile Officer Force." Unpublished research report No. 1280-72, Air Command and Staff College, Air University, Maxwell AFB AL, 1972.
- Lawler, Edward E. III. "A Correlational-Causal Analysis of the Relationship Between Expectancy Attitudes and Job Performance," Journal of Applied Psychology 52 (1968), pp. 462-68.
- Mott, Paul E. The Characteristics of Effective Organizations. New York: Harper and Row, 1972.
- Murphy, Paul Francis. "Missiles, Men and Motivation: The Impact of Educational Program Participation on Performance and Need Satisfaction of Workers Holding Low Intrinsic Satisfaction Jobs: A Study of the Minuteman Education Program Experience at the 351st Strategic Missile Wing." Unpublished doctoral dissertation, Department of Business Administration, Syracuse University, 1973.

Stauffer, Barbara J. Assistant Professor of Mathematics,
Department of Mathematics. Wright State University,
Fairborn OH. Personal interview. 20 June 1979.

Twardzik, Lieutenant Colonel Robert P. ICBM Operations
Inspector, Inspector General. Letter, concerning
roles of the IG and 3901 SMES, to Captain Dana H. Bell,
USAF, 25 September 1978.

Vroom, Victor H. Work and Motivation. New York: John
Wiley and Sons, 1964.

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